VOLUME 62 AUTUMN 1959 NUMBER 3

THE BRYOLOGIST

Quarterly Journal of the American Bryological Society

EDITOR
HOWARD A. CRUM

ASSOCIATE EDITORS
MARGARET FULFORD LEWIS E. ANDERSON
WILLIAM C. STEERE WILLIAM L. CULBERSON

A contribution to the Jamaican Moss Flora *Winona H. Welch and Howard Crum* 165

Notes on the bryophytes of southwest Missouri. II. Fruiting Amblystegium laxirete *Paul L. Redfearn, Jr.* 179

Syrrhopodon parasiticus in the southern United States *William D. Reese* 182

The status of Calliergon subsarmentosum *Harold Robinson* 186

A small collection of West Javanese mosses *Howard Crum* 188

Frullania tenera *Lois Clark* 190

The female inflorescence of Frullania picta *Ruth D. Svihla* 193

Reviews 195

Recent Literature 196

News and Notes 212

THE BRYOLOGIST.—A quarterly journal devoted to the study of North American mosses, hepatics, and lichens, published by the American Bryological Society. **Subscription price, in the United States, $5.00 per year, net; in all other countries, $5.15.**

Back volumes of THE BRYOLOGIST are available from Dr. Lewis E. Anderson, Department of Botany, Duke University, Durham, N. C.; or the Secretary-Treasurer, at the following prices: volumes 1-4, $1.25 each; volumes 5-36, $2.50 each (60 cents per individual number); volume 37, $3.00; volumes 38-45, $3.50 each (85 cents per individual number); volumes 46-49, $4.00 each; volume 50, $8.00; volumes 51-56, $6.00 each ($2.00 per individual number).

PUBLICATION OFFICE: Seeman Printery, Durham, N. C.

Address manuscripts to the Editor:

DR. HOWARD A. CRUM, National Museum of Canada, Ottawa, Ontario, Canada.

Manuscripts should be typewritten, double-spaced, on 8½ by 11 inch sheets. Only first copies (not carbons) should be submitted. Reprints of articles will be supplied at a reasonable price if ordered when corrected galley proof is returned.

Address subscriptions, applications for membership, and advertisements to the Secretary-Treasurer, DR. VIRGINIA S. BRYAN, Department of Botany, Duke University, Durham, N. C.

Address all specimens for identification directly to the Curator concerned.

Entered as second-class matter at the Post Office at Durham, N. C.

OFFICERS OF THE AMERICAN BRYOLOGICAL SOCIETY

President.....JOHN W. THOMSON
University of Wisconsin, Madison

Vice-President.....ELSIE QUARTERMAN
Vanderbilt University, Nashville, Tenn.

Secretary-Treasurer.....VIRGINIA S. BRYAN
Duke University, Durham, N. C.

Editor.....HOWARD A. CRUM
National Museum of Canada, Ottawa

Associate Editors
MARGARET FULFORD, W. C. STEERE, L. E. ANDERSON, W. L. CULBERSON

Curator of the Moss Herbarium.....LEWIS E. ANDERSON
Duke University, Durham, N. C.

Curator of the Hepatic Herbarium.....MARGARET FULFORD
University of Cincinnati, Cincinnati, O.

Curator of the Lichen Herbarium.....WM. A. WEBER
University of Colorado, Boulder

Director of the Moss Exchange.....E. H. KETCHLEDGE
State College of Forestry, Syracuse, N. Y.

Director of the Hepatic Exchange.....LEO F. KOCH
University of Illinois, Urbana

AIBS Representative.....ELBERT L. LITTLE, JR.
U. S. Forest Service, Washington, D. C.

AAAS Representative.....MARGARET FULFORD
University of Cincinnati, Cincinnati, O.

THE BRYOLOGIST

JOURNAL OF

THE AMERICAN BRYOLOGICAL SOCIETY

VOLUME 62 AUTUMN 1959 NUMBER 3

A CONTRIBUTION TO THE JAMAICAN MOSS FLORA

WINONA H. WELCH and HOWARD CRUM[1]

From March 28 to April 6, 1958, the senior author was the guest of Dr. and Mrs. T. G. Yuncker in Jamaica, where Dr. Yuncker was associated with the Department of Botany of the University College of the West Indies as a Fulbright Research Fellow. The following list of mosses consisting of 133 species and varieties from St. Andrew, St. Catherine, St. Ann, St. Mary, Portland, and St. Thomas Parishes includes one species new to science (*Trichostomum fallaciosum*) and six species and one variety new to the Jamaican flora (*Didymodon tophaceus*, *Tortula mniifolia*, *Papillaria nigrescens* var. *donnellii*, *Pilotrichum lophophyllum*, *Lepidopilum stolonaceum*, *Crossomitrium orbiculatum*, and *Neohypnella diversifolia*). In addition, two new combinations are presented. Included with the senior author's collections are records of collections made by Dr. Yuncker, as well as a few by Miss Dulcie A. Powell. A complete set of specimens is deposited in the herbarium of DePauw University.

The senior author is indebted to the Yunckers for the numerous details which made her collections possible and expresses appreciation to Dr. A. D. Skelding and Mrs. Edith T. Robertson of the University College and Miss Dulcie A. Powell of the Institute of Jamaica for arranging excursions to Hardwar Gap and the John Crow Mountains.

SPHAGNUM MERIDENSE (Hampe) C.M. On base of tree in mist forest and on wet forest floor, 4200-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17844, *Yuncker* 17725.

FISSIDENS ASPLENIOIDES Hedw. On soil, mountain roadside and along trail in mist forest, 2600-4800 ft. alt. ST. ANDREW: Fairy Glade, above

[1] Dept. of Botany, DePauw University, Greencastle, Ind.; National Museum of Canada, Ottawa.

Hardwar Gap, Mt. Horeb, *Welch* 17782; roadside, below Newcastle, *Welch* 17826 *p.p.* (with *Breutelia jamaicensis*). PORTLAND: Along trail, north of Hardwar Gap, *Welch* 17617; near waterfall, below Hardwar Gap, *Welch* 17621.

FISSIDENS DISSITIFOLIUS Sull. On soil and limestone and in splash of waterfall, mist forest, 500-4000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17554, 17703 *p.p.* (with *Vesicularia crassicaulis*); below Hardwar Gap, *Welch* 17590, 17593. ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17661 *p.p.* (with *Thuidium involvens*), 17663 *p.p.* (with *Vesicularia crassicaulis*), 17664, 17665, 17672 *p.p.* (with *Pilotrichidium leonii*).

FISSIDENS ELEGANS Brid. On soil, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17580.

FISSIDENS GARBERI Lesq. & James. On limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17731.

FISSIDENS POLYPODIOIDES Hedw. On soil, dead twigs, and rotten log, mist forest, 4500-5000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17753, 17769, 17790, 17793; near summit of Mt. Horeb, W. of Woodcutter's Gap, *Yuncker* 17500; between St. Helen's and Morce's Gaps, *Yuncker* 18721 *p.p.* (with *Hookeriopsis falcata*), 18722.

FISSIDENS WEIRII Mitt. On bark of tree, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17568 *p.p.* (with hepatics).

DITRICHUM RUFESCENS (Hampe) Hampe. On soil, mist forest, 5000-6000 ft. alt. ST. ANDREW: Between St. Helen's Gap and Sir John's Peak, *Yuncker* 18719.

ANGSTROEMIA JAMAICENSIS C.M. On soil, 5000-6000 ft. alt. ST. ANDREW: Between St. Helen's Gap and Sir John's Peak, *Yuncker* 18702; between St. Helen's and Morce's Gaps, *Yuncker* 18724.

DICRANELLA SUBINCLINATA Lor. On soil, 1000-2700 ft. alt. ST. CATHERINE: Between Point Hill and Juan de Bolas Peak, *Yuncker* 18379. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17701.

CAMPYLOPUS FRAGILIS (Turn.) BSG. On rotten log, 5000-6000 ft. alt. ST. ANDREW: Between St. Helen's Gap and Sir John's Peak, *Yuncker* 18706, with brood leaves.—In Europe, *Campylopus fragilis* sometimes produces clusters of brood leaves near the stem tips and then greatly resembles *Brothera leana* (Sull.) C.M. (The two species should not be confused, however, as the costal structures are radically different.) The brood leaves, found also in this Jamaican specimen, are small and crowded, strongly contorted when dry, and readily deciduous. Vegetative reproduction was not mentioned either in Grout's (1937) or William's (1913) descriptions, and we have seen no other American specimens with brood leaves.

CAMPYLOPUS HARRISII (C.M.) Par. On soil, trunks of trees, logs, and moist humus of forest floor, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17788, 17800, 17802, 17817, 17833 *p.p.* (with *Leucobryum albicans*), 17835; along trail to summit of Mt. Horeb from Woodcutter's Gap, *Yuncker* 17571.

CAMPYLOPUS INTROFLEXUS (Hedw.) Brid. On soil, mist zone, ca. 5000 ft. alt. ST. ANDREW: Between St. Helen's and Morce's Gaps, *Yuncker* 18697 *p.p.* (with *Entosthodon bonplandii*).

HOLOMITRIUM CALYCINUM (Hedw.) Mitt. On bark, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17846.

LEUCOLOMA CRUEGERIANUM (C.M.) Jaeg. On rotten log, mist forest,

ca. 4500 ft. alt. ST. ANDREW: Along trail to summit of Mt. Horeb from Woodcutter's Gap, *Yuncker* 17568.

LEUCOLOMA SERRULATUM Brid. On trees, mist forest, 4000-4800 ft. alt. PORTLAND: Along trail N. of Hardwar Gap, *Welch* 17572, 17575, 17576 *p.p.* (with hepatics), 17611 *p.p.* (with *Rhizogonium spiniforme*), *Yuncker* 18512 *p.p.* (with *Syrrhopodon prolifer*). ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17787, 17791, 17923.

LEUCOBRYUM ALBICANS (Schwaegr.) Lindb. On rotten bark and at base of tree, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17760, 17761, 17833.

LEUCOBRYUM ANTILLARUM Schimp. On base of tree and on humus near base of tree, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17801, 17806, 17822 *p.p.* (with hepatics). PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17585.

LEUCOBRYUM CRISPUM C.M. On bark of base and root of tree, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17822 *p.p.* (with hepatics), 17832, 17845. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17571, 17635.

LEUCOBRYUM GIGANTEUM C.M. On moist soil and wet humus, mist forest, 4200-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17820, *Yuncker* 17557, 17724.

OCTOBLEPHARUM ALBIDUM Hedw. On trunks and roots of trees and on logs, 500-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17732; above Moore Town, Joe Hill, John Crow Mts., *Yuncker* 18832. ST. THOMAS: Bath Botanical Garden, *Welch* 17648; along Sulphur River, Bath Fountain, *Welch* 17651.—This pantropical species is common in Florida. William Reese recently wrote that there is a specimen in the Tulane University Herbarium collected by Faith Mackaness in Orleans Parish, Louisiana; this specimen was reported in the literature by Koch (1957). It also occurs in Texas (Whitehouse & McAllister, 1954).

OCTOBLEPHARUM ERECTIFOLIUM Mitt. On mossy logs and roots and trunks of trees, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17777 *p.p.* (with *Syrrhopodon prolifer*), 17855, *Yuncker* 17699. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17606.

SYRRHOPODON INCOMPLETUS Schwaegr. On logs and roots, 500-2000 ft. alt. ST. MARY: Castleton Botanical Garden, *Welch* 17742. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17542 *p.p.* (with *Isopterygium subtenerrimum*).

SYRRHOPODON LYCOPODIOIDES (Sw.) C.M. On rich soil, rotten logs, and trees, mist forest, 4400-6000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17791A; along trail from St. Helen's Gap to Sir John's Peak, *Yuncker* 18698, 18706 *p.p.* (with *Campylopus fragilis*); Morce's Gap, *Yuncker* 18729.

SYRRHOPODON PARASITICUS (Sw.) C.M. On moist tree trunk, mist forest, ca. 2000 ft. alt. ST. THOMAS: Corn Puss Gap, John Crow Mts., *Yuncker* 18090a.—This is the second record of this species for Jamaica.

SYRRHOPODON PROLIFER Schwaegr. On humus, roots, and tree trunks, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17777, 17854, 17855 *p.p.* (with *Octoblepharum erectifolium*). PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17606 *p.p.* (with *Octoblepharum erectifolium*), 17635 *p.p.* (with *Leucobryum crispum*), *Yuncker* 18512.

CALYMPERES EMERSUM C.M. On trunks of *Cycas revoluta* and trees,

500-2000 ft. alt. ST. MARY: Castleton Botanical Garden, *Welch* 17747. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17679, 17681—According to William Reese (*in lit.*), *C. erosum* C.M. is an older name which includes *C. emersum* C.M. in synonymy.

CALYMPERES GUILDINGII Hook & Grev. On tree trunk, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17631A.

CALYMPERES RICHARDII C.M. On tree trunks, 100-2000 ft. alt. PORTLAND: Above Moore Town, Joe Hill, John Crow Mts., *Yuncker* 18832 *p.p.* (with *Octoblepharum albidum*). ST. THOMAS: Bath Botanical Garden, *Welch* 17649, 17650.

WEISSIA CONTROVERSA var. AUSTRALIS (Aust.) Schornh. On limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., S.W. of Ecclesdown, *Welch* 17682.

Trichostomum fallaciosum n. sp.[2]—Plants 5-12 mm. high, rigid, dull, yellowish-brown to green, caespitose. Leaves erect, the tips contorted when dry, 3-5 mm. long, linear from a slightly wider, oblong or oblanceolate base, slenderly acute and apiculate, concave; margins incurved (or occasionally erect), entire; costa 60-80 μ wide near the base, shortly excurrent as a sharp, yellow apiculus; basal cells pale, smooth, rectangular, not notably lax and not forming a border at the shoulders, upper cells 6-7 μ, rounded-quadrate or hexagonal, densely papillose and obscure. Dioicous (?). Seta 12-13 mm. long; urn of capsule erect and cylindric, 1.5-1.75 mm. long; peristome teeth well developed, slightly twisted. Spores 13-15 μ, densely and finely papillose.

On limestone in forest, 1000-2000 ft. alt., John Crow Mountains, southwest of Ecclesdown, Portland Parish, JAMAICA, *Winona H. Welch* 17709, March 30, 1958, sterile (type, DPU; isotype, CAN). On rock, 1000 ft. alt., Cascade, Hanover Parish, JAMAICA, *Amy von der Porten*, April 14, 1950, *c.fr.* (CAN). On shaded clay bank, ca. 1000 m. alt., upper slopes of Pico Sombrero, Las Villas Province, CUBA, *Grady L. Webster* 4763, July 19, 1953, sterile (CAN).

This species is distinct from its local allies in its very narrow, wispy leaves in which respect it strongly resembles *Tortella mollissima* Broth. ex Bartr. The latter species is more delicate in stature and has rather more crisped leaves with shiny white bases and laxer basal cells extending upward at the shoulders to form a more or less distinct border. *Trichostomum angustifolium* Crum & Steere is similar in size and aspect, but it has erect, notched leaf margins. *Trichostomum jamaicense* (Mitt.) Jaeg. and *T. sublamprothecium* Par., both rather common in Jamaica, are by comparison very robust species.

TRICHOSTOMUM JAMAICENSE (Mitt.) Jaeg. On limestone and soil, 500-3000 ft. alt. ST. ANDREW: Roadside, below Newcastle, *Welch* 17825. ST. CATHERINE: Along Rio Cobre, S. of Bog Walk, *Welch* 17882.

TRICHOSTOMUM SUBLAMPROTHECIUM Par. On soil on abutment of bridge, ca. 4000 ft. alt. ST. ANDREW: Above Newcastle, *Welch* 17785, 17786.

HYOPHILA TORTULA (Schwaegr.) Hampe. On soil, limestone and concrete wall, 500-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap,

[2] Plantae 5-12 mm. altae, rigidae, obscurae, flavido-brunneae vel virides, caespitosae. Folia erecta, sicca apicibus contorta, 3-5 mm. longa, lineares e basi anguste oblonga vel oblanceolata, anguste acuta et apiculata, concava, marginibus involutis vel rarim erectis, integris; costa basi 60-80 μ, breviter excurrens; cellulae basilares pallidae, laeves, oblongae, superae 6-8 μ, rotundo-quadratae vel sexangulares, dense papillosae, obscurae. Dioicum (?). Seta 12-13 mm. alta; theca erecta, cylindrica, 1.5-1.75 mm. alta. Sporae 13-15 μ, dense et minute papillosae.

Mt. Horeb, *Welch* 17841. ST. CATHERINE: Along Rio Cobre, S. of Bog Walk, *Welch* 17864, 17868, 17869, 17873, 17876, 17879, 17880. ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17656, 17674.

BARBULA AGRARIA Hedw. On limestone and concrete, 500-2000 ft. alt. ST. ANDREW: Long Mt., *Welch* 17640, 17643, 17644; Mona, *Welch* 17884. ST. CATHERINE: Along Rio Cobre, S. of Bog Walk, *Welch* 17881. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17680. ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17673.

BARBULA CRUEGERI Sond. ex C.M. On limestone and soil, 500-3000 ft. alt. ST. ANDREW: Long Mt., *Welch* 17645; along trail, Jack's Hill, *Yuncker* 17671. ST. CATHERINE: Along Rio Cobre, S. of Bog Walk, *Welch* 17875, 17880.

BARBULA FARRIAE Crum & Bartr. On limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17685.

BARBULA ORIZABENSIS C.M. On soil, 600-1700 ft. alt. ST. ANDREW: Roadside, below Newcastle, *Welch* 17825 *p.p.* (with *Trichostomum jamaicense*). ST. THOMAS: Near Mahogany Vale foot bridge, *Yuncker* 18320.

DIDYMODON TOPHACEUS (Brid.) Jur. On limestone, at base of roadside waterfall, edge of forest, 0-10 ft. alt. ST. THOMAS: Near sea at Rozelle, *Welch* 17646.—A calciphile not previously known from Jamaica; it occurs also in Haiti, Europe, Africa, Asia, North America southward to Guatemala, and northern South America.

LUISIERELLA BARBULA (Schwaegr.) Steere. On limestone, 800-2000 ft. alt. ST. ANDREW: Long Mt., *Welch* 17642 *p.p.* (with *Desmatodon sprengelii*). PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17683.

SPLACHNOBRYUM SPLACHNIFOLIUM (Hook.) Thér. On limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17689.

DESMATODON SPRENGELII (Schwaegr.) Williams. On limestone and dry concrete wall, 500-1000 ft. alt. ST. ANDREW: Long Mt., *Welch* 17640 *p.p.* (with *Barbula agraria*), 17641, 17642. ST. MARY: Castleton Botanical Garden, *Welch* 17749.

TORTULA MNIIFOLIA (Sull.) Mitt. On soil, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17783.—A first record for Jamaica; this species is distributed in Mexico, Guatemala, Costa Rica, western South America to Bolivia and northern Peru, and the West Indies.

ENTOSTHODON BONPLANDII (Hook.) Mitt. On soil, mist zone, ca. 5000 ft. alt. ST. ANDREW: Between St. Helen's and Morce's Gaps, *Yuncker* 18097.

FUNARIA CALVESCENS SCHWAEGR. On soil, mist forest, ca. 4500 ft. alt. ST. ANDREW: Along trail from Woodcutter's Gap to near summit of Mt. Horeb, *Yuncker* 17567.

POHLIA FLEXUOSA Hook. On moist soil, ca. 4000 ft. alt. ST. ANDREW: Near Hardwar Gap, *Yuncker* 17570.

ANOMOBRYUM FILIFORME var. MEXICANUM (Schimp.) Par. On soil and rock, 2000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17784, 17841 *p.p.* (with *Hyophila tortula*); roadside, below Newcastle, *Welch* 17826 *p.p.* (with *Breutelia jamaicensis*).

BRYUM CRUEGERI Hampe ex C.M. On limestone, concrete wall, and soil, 0-2000 ft. alt. ST. THOMAS: Near sea at Rozelle, *Welch* 17647; along Sulphur River, Bath Fountain, *Welch* 17659 *p.p.* (with *Vesicularia crassicaulis*), 17676 *p.p.* (with *Philonotis glaucescens*); Corn Puss Gap, John Crow Mts., *Yuncker* 18089, 18102.

MNIUM LONGIROSTRUM Brid. On rock in splash from waterfall and on moist clay, mist forest, ca. 4000 ft. alt. ST. ANDREW: Near Hardwar Gap,

Yuncker 17572 *p.p.* (with hepatic). PORTLAND: At base of waterfall, along trail, below Hardwar Gap, *Welch* 17594 *p.p.* (with hepatics).

Hymenodon aeruginosus (Hook. f. & Wils.) C.M. On trunk of dead tree fern, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17626.—This specimen is interesting because of the clusters of propagula in the leaf axils. The propagula are dark brown, filiform or slenderly clavate, up to 380 × 28 μ, and consist of uniseriate, obscurely roughened cells. (The roughness seems mostly internal, but a few external papillae were seen.) Similar propagula have been seen on plants from the Dominican Republic (*Allard* 18682a).

RHIZOGONIUM SPINIFORME (Hedw.) Bruch. On logs, trees, and soil, 1000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17759, 17799; near summit of Mt. Horeb, E. of Hardwar Gap, *Yuncker* 17556; near summit of Mt. Horeb, along trail from Woodcutter's Gap, *Yuncker* 17564. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17550, 17732 *p.p.* (with *Octoblepharum albidum*); along trail, N. of Hardwar Gap, *Welch* 17568a, 17581 *p.p.* (with *Thuidium urceolatum*), 17611. ST. THOMAS: John Crow Mts., Corn Puss Gap, *Yuncker* 18091.

LEIOMELA BARTRAMIOIDES (Hook.) Par. On rocks and logs, mist forest, ca. 4000 ft. alt. PORTLAND: Near waterfall, along trail, below Hardwar Gap, *Welch* 17614, 17618.

PHILONOTIS GLAUCESCENS (Hornsch.) Par. On soil, limestone, and concrete wall, 500-2000 ft. alt. ST. CATHERINE: Rio Cobre, S. of Bog Walk, *Welch* 17865 *p.p.* (with alga). PORTLAND: John Crow Mts., SW. of Ecclesdown, *Powell*, March 30, 1958, *Welch* 17700, 17706, 17718 *p.p.* (with *Vesicularia crassicaulis*). ST. THOMAS: Sulphur River, Bath Fountain, *Welch* 17654, 17675, 17676; John Crow Mts., Corn Puss Gap, *Yuncker* 18088.

BREUTELIA JAMAICENSIS (Mitt.) Jaeg. On soil, 2000-4000 ft. alt. ST. ANDREW: Hardwar Gap, *Welch* 17789; roadside, below Newcastle, *Welch* 17826.

BREUTELIA TOMENTOSA (Sw.) Schimp. On soil, roots, and logs, mist forest, 4000-6000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17842 *p.p.* (with *Polytrichum juniperinum*); between St. Helen's Gap and Sir John's Peak, *Yuncker* 18710. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17569, 17612.

ERPODIUM DOMINGENSE (Spreng.) C.M. On root of tree, ca. 600 ft. alt. ST. ANDREW: Hope Botanical Garden, *Welch* 17861.

GROUTIELLA APICULATA (Hook.) Crum & Steere. On logs, tree trunks, and soil, 1000-5000 ft. alt. ST. CATHERINE: Between Point Hill and Juan de Bolas Peak, *Yuncker* 18376. ST. ANN: Along way to Hollymount, *Yuncker* 18271 *p.p.* (with *Papillaria nigrescens*). PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17691, 17719, 17720, 17739 *p.p.* (with *Macromitrium cirrosum*).

GROUTIELLA FRAGILIS (Mitt.) Crum & Steere. On tree, in forest, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17720 *p.p.* with *Groutiella apiculata*).

MACROMITRIUM CIRROSUM (Hedw.) Brid. On soil, tree trunks and branches, and rotten logs, 1000-6000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17754, 17774, 17849; near summit of Mt. Horeb, E. of Hardwar Gap, *Yuncker* 17559 *p.p.* (with *Mittenothamnium reptans*); along trail, between St. Helen's Gap and Sir John's Peak, *Yuncker* 18699, 18705. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17566, 17719 *p.p.* (with *Groutiella apiculata*); along trail, N. of Hardwar Gap, *Welch* 17589, 17631, *Yuncker* 18508 *p.p.* (with *Acroporium pungens*).

Var. STENOPHYLLUM (Mitt.) Grout., On bark, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17773.

Macromitrium perichaetiale (Hook. & Grev.) C.M. On bark, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17815.

Macromitrium richardii Schwaegr. On moist tree trunk, mist forest, ca. 2000 ft. alt. ST. THOMAS: John Crow Mts., Corn Puss Gap, *Yuncker* 18090.

SCHLOTHEIMIA TORQUATA (Hedw.) Brid. On rotting logs and on tree trunks, mist forest, 4000-6000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17755; between St. Helen's Gap and Sir John's Peak, *Yuncker* 18707. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17629 *p.p.* (with *Pilotrichella flexilis*), 17634.

RHACOPILUM TOMENTOSUM (Hedw.) Brid. On soil, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17712 *p.p.* (with *Selaginella*).

LEUCODONTOPSIS GENICULATA (Mitt.) Crum & Steere. On stems of *Croton* and tree ferns and on stumps, 500-1000 ft. alt. ST. CATHERINE: Along Rio Cobre, S. of Bog Walk, *Welch* 17871. ST. MARY: Castleton Botanical Garden, *Welch* 17745, 17746 *p.p.* (with *Crossomitrium sintenisii*).

PIRELLA CAVIFOLIA (Card. & Herz.) Card. On tree, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17573.

SQUAMIDIUM LEUCOTRICHUM (Tayl.) Broth. On trees, mist forest, 4400-6000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17755 *p.p.* (with *Schlotheimia torquata*); between St. Helen's Gap and Sir John's Peak, *Yuncker* 18705 *p.p.* (with *Macromitrium cirrosum*).

PILOTRICHELLA FLEXILIS (Hedw.) Jaeg. On trees, logs, and soil on rocks, 2000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17755 *p.p.* (with *Schlotheimia torquata*), 17764, 17803 *p.p.* (with *Isodrepanium lentulum*), 17809, 17818, 17843; roadside, below Newcastle, *Welch* 17839 *p.p.* (with lichen). PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17574, 17629.

PAPILLARIA NIGRESCENS (Hedw.) Jaeg. On rotten log, 2000-2500 ft. alt. ST. ANN: Along way to Hollymount, *Yuncker* 18271. Var. BONNELLII (Aust.) E. G. Britt. On soil, rocks, and tree trunks, 50-3500 ft. alt. ST. CATHERINE: Between Point Hill and Juan de Bolas, *Yuncker* 18388. MANCHESTER: Brown's Wood near Bog Walk, *Britton* 851. ST. MARY: Palmetto Grove, *Farr* 772. TRELAWNEY: Windsor estate, *Powell* 390, 393, 395; Alps district, 1.5 mi. NXW. of Ulster Spring, *Powell* 358. ST. ANN: 7 mi. NE. of Moneaque Police Station, *Farr* 195; St. Ann's Bay, *Farr* 1489. ST. ANDREW: Newcastle Road, between 16 and 17 mile posts, *Farr* 100.—This well-marked variety has never been reported outside Florida before. All the Florida material of *Papillaria nigrescens* at Duke University and at the National Museum of Canada belongs here, as does a specimen from Louisiana (*Reese* 1890, CAN). It is possible that the species proper does not occur in the United States. Other collections have been seen from Mexico, Haiti, the Bahamas, and the Galapagos Islands. The variety can be recognized by its rather slender stature, straggling appearance, loosely arranged leaves, and, most especially, its many branches regularly denuded of leaves except for a terminal tuft. No small flagelliferous branches were seen in specimens of the variety.

METEORIUM ILLECEBRUM (C.M.) Mitt. On trees and logs, 2000-4000 ft. alt. ST. ANDREW: Roadside, below Newcastle, *Welch* 17837. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17583, 17610.

METEORIOPSIS PATULA (Hedw.) Broth. On tree trunk, mist forest, ca. 4000 ft. alt. ST. ANDREW: Hardwar Gap. *Yuncker* 17637.

METEORIOPSIS REMOTIFOLIA (C.M.) Broth. On trunk and branches of trees, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17752A, 17754 *p.p.* (with *Macromitrium cirrosum*), 17848, 1749 *p.p.* (with *Macromitrium cirrosum*), 17851. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17609, 17615, 17636.

LINDIGIA ACICULATA (Tayl.) Jaeg. On trees, in splash from waterfall, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, below Hardwar Gap, *Welch* 17622 *p.p.* (with *Lepidopilum muelleri*), 17623.

Phyllogonium fulgens (Hedw.) Brid. On trunks and branches of trees and on trunks of tree ferns, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17796, 17797. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17578, 17586, *Yuncker* 18508 *p.p.* (with *Macromitrium cirrosum*); near waterfall, along trail below Hardwar Gap, *Welch* 17636 *p.p.* (with *Meteoriopsis remotifolia*).

NECKEROPSIS DISTICHA (Hedw.) Kindb. On tree trunks, 500-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Powell*, March 30, 1958, *p.p.* (with *Neckeropsis undulata*), *Welch* 17690 *p.p.* (with hepatics), 17693 *p.p.* (with hepatics). ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17657, 17658, 17670.

NECKEROPSIS UNDULATA (Hedw.) Reich. On tree trunks, 500-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Powell*, March 30, 1958, *Welch* 17693 *p.p.* (with hepatics). ST. THOMAS: Sulphur River, Bath Fountain, *Welch* 17669, 17670 *p.p.* (with *Neckeropsis disticha*).

POROTRICHUM INSULARUM Mitt. On trunks and branches of trees and on rocks in splash of waterfall, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap. *Welch* 1757A; near waterfall, along trail, below Hardwar Gap, *Welch* 17592 *p.p.* (with hepatics), 17600 *p.p.* (with *Lepidopilum diaphanum*).

POROTRICHUM COBANENSE C.M. On rocks, in a splash of waterfall, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, below Hardwar Gap, *Welch* 17602 *p.p.* (with hepatics), 17637).

PILOTRICHUM AMAZONUM Mitt. On tree trunk, ca. 500 ft. alt. ST. THOMAS: Sulphur River, Bath Fountain, *Welch* 17662A.

PILOTRICHUM LOPHOPHYLLUM Sull. On tree, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17584.—Not previously reported from Jamaica, this species is known from Cuba, Haiti, Sto. Domingo, and Puerto Rico.

PILOTRICHIDIUM LEONII (Thér.) Crum & Bartr. On soil and moist to wet limestone, 500-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Powell*, March 30, 1958. ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17668, 17672.

DIPLONEURON CONNIVENS Bartr. On limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17728.

LESKEODON AURATUS (C.M.) Broth. On wet rock, mist forest, ca. 4000 ft. alt. PORTLAND: Near waterfall, along trail, below Hardwar Gap, *Welch* 17597A.

CYCLODICTYON ALBICANS (Hedw.) Broth. On trees, rotten logs, and wet rocks, mist forest, 3900-4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17577, 17613, *Yuncker* 18521; near waterfall, along trail, below Hardwar Gap, *Welch* 17603 *p.p.* (with *Hookeriopsis guadalupensis*), 17627 *p.p.* (with hepatics).

CYCLODICTYON VARIANS (Sull.) Broth. On rotting logs, trunks and roots

of trees, and wet rocks, 1000-4000 ft. alt. ST. CATHERINE: Between Point Hill and Juan de Bolas, *Yuncker* 18390 *p.p.* (with *Vesicularia crassicaulis*). ST. ANN: Along way to Hollymount, *Yuncker* 18256 *p.p.* (with *Callicostella* sp.). PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17539, 17561, 17730 *p.p.* (with *Lepidopilum stolomaceum*); along trail, N. of Hardwar Gap, *Yuncker* 18520 *p.p.* (with *Lepidopilum polytrichoides*); near waterfall, along trail, below Hardwar Gap, *Welch* 17596.

CALLICOSTELLA DEPRESSA (Hedw.) Jaeg. On buttress of tree, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17560.

CALLICOSTELLA PALLIDA (Hornsch.) Angstr. On rotten log, in thicket, 2000-2700 ft. alt. ST. CATHERINE: Between Point Hill and Juan de Bolas, *Yuncker* 18390 *p.p.* (with *Vesicularia crassicaulis*).

HOOKERIOPSIS FALCATA (Hook.) Jaeg. On trees and rotten logs, mist forest, 4400-5000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17757; between St. Helen's and Morce's Gaps, *Yuncker* 18721.

HOOKERIOPSIS GUADALUPENSIS (Brid.) Jaeg. On rotten logs and trees, mist forest, 3900-4000 ft. alt. PORTLAND: Near waterfall, along trail, below Hardwar Gap, *Welch* 17603; along trail, N. of Hardwar Gap. *Yuncker* 18521A *p.p.* (with *Leucomium compressum*).

HOOKERIOPSIS UNDATA (Hedw.) Jaeg. On soil and trees, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17813 *p.p.* (with *Rhynchostegiopsis flexuosa*), 17853.—*Hookeriopsis acicularis* (Mitt.) Jaeg. is easily confused with this species and is poorly distinguished from it in Crum & Bartram's key (1958). In *H. acicularis* the leaves are generally rather less rugose and somewhat more broadly acuminate, and the cells, at least in the acumina, are usually more thick-walled and obscure. These are variable features, however, and can be matched with perfect ease in some specimens of *H. undata*. The species are best separated by the nature of the teeth at the back of the costae. In *H. acicularis*, each costa ends abruptly in a large tooth which projects at a wide angle and often consists of a number of cells. There is usually at least one other similar but smaller tooth below the terminal one, and sometimes there are two or three, but all are limited to the end of the costa. In *H. undata*, the costae are evenly toothed well below the tips, often as much as half their lengths; the teeth are only moderately large and unicellular and do not project at wide angles. Other helpful differences are the considerably larger teeth at the leaf margins in *H. undata* and the sexual condition (autoicous in *H. acicularis!*, apparently dioicous in *H. undata*).

A review of all the specimens at the New York Botanical Garden and the National Museum of Canada provided records of *H. undata* from Cuba and Jamaica, Costa Rica and Panama, Colombia, Ecuador, Venezuela, Brazil, Bolivia, and Peru. *H. undata* seems to be quite common in Jamaica, on soil, logs, and trunks of trees at altitudes of 4300-5800 ft. *H. acicularis* is known from Jamaica only from the type collection, "Ins. Jamaica, Herb. Hooker"; specimens from Puerto Rico, the Dominican Republic, and Guadeloupe have also been verified.

LEPIDOPILUM DIAPHANUM (Hedw.) Mitt. On trunk and branches of trees, and on wet rock, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17577a, 17619; near waterfall, along trail, below Hardwar Gap, *Welch* 17595 *p.p.* (with hepatics), 17597, 17598, 17600, 17601.

LEPIDOPILUM MUELLERI (Hampe) Mitt. On trees, mist forest, ca. 4000 ft. alt. PORTLAND: Near waterfall, along trail, below Hardwar Gap. *Welch* 17591, 17622, 17623 *p.p.* (with *Lindigia aciculata*).

LEPIDOPILUM POLYTRICHOIDES (Hedw.) Brid. On trunks, branches, and

leaves of trees, also on logs and limestone, 1000-3000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17540 *p.p.* (with *Vesicularia crassicaulis*, 17559, 17563, 17564, 17565 *p.p.* (with *L. stolonaceum*), 17723, 17729, 17736; along trail, N. of Hardwar Gap, *Yuncker* 18520.

LEPIDOPILUM STOLONACEUM C.M. On roots, trunks, and branches of trees and on logs, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17544, 17548, 17565, 17730, 17734, 17737 *p.p.* (with *Crossomitrium orbiculatum*).—New to Jamaica, this species is also known from Cuba, Puerto Rico, Montserrat, Martinique, and Guadeloupe. The sporophyte, previously unknown, can now be described, as follows: Setae dark red, papillose throughout, 5-8 mm. long. Capsules erect, dark red, 1-1.5 mm. long; operculum erect, rostrate, 1 mm. long; peristome teeth dark brown, linear, papillose, bordered; segments long-linear from a well-developed basal membrane, brownish-yellow, papillose, not keeled or perforate. Spores green, spherical, very slightly roughened, 15-18 μ. Calyptra mitrate, moderately hairy.

LEPIDOPILUM TORTIFOLIUM Mitt. On soil on rock, mist forest, ca. 4000 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17607.

ISODREPANIUM LENTULUM (Wils.) Britt. On trunks of trees, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17762, 17763, 17767, 17772, 17792, 17794, 17803, 17811, 17832, 17852, 17856.

CROSSOMITRIUM ORBICULATUM C.M. On twig in forest, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17737.—New to Jamaica; also known from Haiti, Puerto Rico, Dominica, Montserrat, Guadeloupe, Martinique, and Trinidad.

CROSSOMITRIUM SINTENISII C.M. On leaves of trees and on stems and fronds of tree ferns, 500-2000 ft. alt. ST. MARY: Castleton Botanical Garden, *Welch* 17746. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17551, 17562 *p.p.* (with hepatics).

Neohypnella diversifolia (Mitt.) n. comb. *Hookeria diversifolia* Mitt., Jour. Linn. Soc. London, Bot. 12: 364. 1869. *Hypnella diversifolia* (Mitt.) Jaeg., Ber. St. Gall. Naturw. Gesell. 1875-76: 366. 1877. *Hookeria chrysophyllopodia* C.M., Hedwigia 37: 249. 1898. *Hookeria pilotrichelloides* Broth., Trans. Linn. Soc. London, Bot. 6: 92. 1901. *Hypnella chrysophyllopodia* (C.M.) Broth. *in* Engler & Prantl, Nat. Pfl. 1(3): 950. 1907. *Hypnella pilotrichelloides* (Broth.) Broth., *l. c.* 1907. *Pseudohypnella mucronifolia* Bartr., Contr. U. S. Nat. Herb. 26(3): 104. 1928 (*e descr.*). On bark of trees and on the frond of a small fern, mist forest, 4400-4800 ft. alt. ST. ANDREW: Fairy Glade, Mt. Horeb, above Hardwar Gap, *Welch* 17751, 17758, 17775.—A noteworthy addition to the Jamaican flora, this large and attractive species is also known from Trinidad (*Broadway* 7119, 7991a, BARTRAM), British Guiana (*Quelch & McConnell* 337, isotype of *Hookeria pilotrichelloides* Broth., NY), Venezuela (*Tate* 508, NY), and Ecuador (*Spruce*, 678, type of *Hookeria diversifolia* Mitt., NY). Müller's type of *Hookeria chrysophyllopodia* from Trinidad was not seen, but according to Bartram (1928), Brotherus wrote him that *H. pilotrichelloides* is synonymous with it. Certainly the above-mentioned Trinidad specimens named *Hypnella chrysophyllopodia* by Bartram fit nicely here. Brotherus (1907, 1925) admitted that he had not seen material of *Hookeria diversifolia*. He obviously did not understand its relationship; he placed it in section A of his key to *Hypnella* and put *H. chrysophyllopodia* and *H. pilotrichelloides* in section B.

The three Jamaican and two Trinidad specimens cited above have narrow, oblong-lanceolate or ovate-lanceolate, acute leaves which are often somewhat

homomallous, and the mucros are not always recurved. This seems to be the form which Müller described as *Hookeria chrysophyllopodia*. The type of *Hookeria pilotrichelloides* shows some branches with leaves similar to the above, but most of them have broader, ovate leaves, clearly obtuse and ending in recurved mucros. The type of *Hookeria diversifolia* is similar. The transition between the extremes is more clearly apparent in Tate's Venezuelan plants. The supposed differences are not very significant, at best. *Neohypnella mucronifolia* Bartr. of Costa Rica seems doubtfully distinct, as it was based solely on leaf shape; it appears to be the broader-leaved form. Mitten's choice of a specific epithet aptly applies to all such minor variations.

RHYNCHOSTEGIOPSIS FLEXUOSA (Sull.) C.M. On tree trunk and logs, mist forest, 4000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17813. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17581 *p.p.* (with *Thuidium urceolatum*).

LEUCOMIUM COMPRESSUM Mitt. On tree, mist forest, ca. 3900 ft. alt. PORTLAND: Along trail, N. of Hardwar Gap, *Yuncker* 18521A.

HELICODONTIUM CAPILLARE (Hedw.) Jaeg. On trunks and branches of trees, 500-600 ft. alt. ST. ANDREW: Hope Botanical Garden, *Welch* 17863. ST. CATHERINE: Along Rio Cobre, S. of Bog Walk, *Welch* 17878, 17883.

HAPLOCLADIUM MICROPHYLLUM (Hedw.) Broth. On rotting logs, soil, and limestone, 500-2500 ft. alt. ST. ANN: Along way to Hollymount, *Yuncker* 18256 *p.p.* (with *Callicostella* sp.). PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17692 *p.p.* (with hepatics), 17697 *p.p.* (with hepatics), 17702, 17724 *p.p.* (with *Ectropothecium apiculatum*). ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17652, 17653 *p.p.* (with *Vesicularia crassicaulis*).

THUIDIUM INVOLVENS (Hedw.) Mitt. On tree trunks, decaying logs, and limestone, ca. 500 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Powell*, March 30, 1958 (with *Ectropothecium apiculatum*). ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17652 *p.p.* (with *Haplocladium microphyllum*), 17659 *p.p.* (with *Vesicularia crassicaulis*), 17661, 17666, 17667 *p.p.* (with *Fissidens* sp.), 17677 *p.p.* (with *Taxithelium planum*).

THUIDIUM MINUTULUM (Hedw.) BSG. On logs and tree trunks, mist forest, 4000-4500 ft. alt. ST. ANDREW: Approaching summit of Mt. Horeb, W. of Woodcutter's Gap, *Yuncker* 17563. PORTLAND: Near waterfall, along trail, below Hardwar Gap, *Welch* 17616.

THUIDIUM URCEOLATUM Lor. On tree trunks, logs, limestone, and soil, 1000-5000 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17760, 17812; roadside, below Newcastle, *Welch* 17827; near Hardwar Gap, *Yuncker* 17572 *p.p.* (with hepatics); between St. Helen's and Morce's Gaps, *Yuncker* 18721 *p.p.* (with *Hookeriopsis falcata*). PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17540 *p.p.* (with *Vesicularia crassicaulis*), 17541, 17549 *p.p.* (with *Vesicularia vesicularis*), 17678, 17687, 17690 *p.p.* (with hepatic), 17694, 17711, 17715 *p.p.* (with *Isopterygium subtenerrimum*), 17716 *p.p.* (with lichen), 17726; along trail, N. of Hardwar Gap, *Welch* 17581, 17582, *Yuncker* 18526.

CAMPYLIUM CHRYSOPHYLLUM (Brid.) Bryhn. On shale, ca. 5000 ft. alt. ST. ANDREW: Near St. Helen's Gap, *Yuncker* 18664.

LEPTODONTOPSIS TRICHOPHYLLA (Hedw.) Broth. On tree trunks, mist forest, 1000-4800 ft. alt. ST. ANDREW: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17771, 17810. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17725; along trail, N. of Hardwar Gap, *Welch* 17583

p.p. (with *Meteorium illecebrum*), 17630, *Yuncker* 18512 p.p. (with *Syrrhopodon prolifer*).

Brachythecium stereopoma (Spruce ex Mitt.) Jaeg. On soil, 1000-3000 ft. alt. St. Andrew: Roadside, below Newcastle, *Welch* 17824. Portland: John Crow Mts., SW. of Ecclesdown, *Welch* 17702 *p.p.* (with *Haplocladium microphyllum*). St. Thomas: Near Mahogany Vale foot bridge, *Yuncker* 18320 *p.p.* (with *Barbula orizabensis*).

Oxyrrhynchium rigescens (C.M.) Crum & Bartr. In splash from waterfall, mist forest, ca. 4000 ft. alt. Portland: Along trail, below Hardwar Gap, *Welch* 17628.

Stereophyllum leucostegum (Brid.) Mitt. On trunk and root of tree and on limestone, 500-600 ft. alt. St. Andrew: Mona, *Welch* 17639; Hope Botanical Garden, *Welch* 17860 *p.p.* (with hepatics), 17862. St. Thomas: Along Sulphur River, Bath Fountain, *Welch* 17677 *p.p.* (with *Taxithelium planum*).

Stereophyllum radiculosum (Hook.) Mitt. On tree trunk, root, and dead stem, 600-1800 ft. alt. St. Andrew: Hope Botanical Garden, *Welch* 17857, 17860 *p.p.* (with hepatics). St. Thomas: Near Mahogany Vale foot bridge, *Yuncker* 18312.

Pterogonidium pulchellum (Hook.) C.M. On bamboo trunk and root and on base of palm, 500-2000 ft. alt. St. Mary: Castleton Botanical Garden, *Welch* 17740, 17742 *p.p.* (with *Syrrhopodon incompletus*), 17743 *p.p.* (with *Isopterygium tenerum*). Portland: John Crow Mts., SW. of Ecclesdown, *Welch* 17722.

Sematophyllum caespitosum (Hedw.) Mitt. On tree trunk and wet rotting log, 100-2000 ft. alt. St. Thomas: Bath Botanical Garden, *Welch* 17649 *p.p.* (with *Calymperes richardii*); John Crow Mts., Corn Puss Gap, *Yuncker* 18086.

Sematophyllum galipense (C.M.) Mitt. On rock, 500-1000 ft. alt. St. Mary: Castleton Botanical Garden, *Welch* 17741.

Sematophyllum leprophyllum Mitt. On tree trunks and logs, mist forest, 4000-6000 ft. alt. St. Andrew: Hardwar Gap, *Yuncker* 17645; Cinchona, *Yuncker* 18663; between St. Helen's Gap and Sir John's Peak, *Yuncker* 18716. Portland: Along trail, N. of Hardwar Gap, *Welch* 17581 *p.p.* (with *Thuidium urceolatum*), 17633, 17634 *p.p.* (with *Schlotheimia torquata*), *Yuncker* 18511.

Sematophyllum subsimplex (Hedw.) Mitt. On bark, mist forest, 4400-4800 ft. alt. St. Andrew: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17765 *p.p.* (with *Sematophyllum insularum*), 17778.

Sematophyllum swartzii (Schwaegr.) n. comb. *Hookeria swartzii* Schwaegr., Suppl. Sp. Musc. 3, 2(2): Pl. 270a. 1830. *Lepidopilum swartzii* (Schwaegr.) Schimp. ex Jaeg., Ber. St. Gall. Naturw. Gesell. 1875-76: 334. 1877. On trunks of trees and rotting logs, 2000-5000 ft. alt. St. Andrew: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17765, 17768, 17770; between St. Helen's and Morce's Gaps, *Yuncker* 18721 *p.p.* (with *Hookeriopsis falcata*). St. Ann: Along way to Hollymount, *Yuncker* 18256 *p.p.* (with *Callicostella* sp.). Portland: Along trail, N. of Hardwar Gap, *Welch* 17581 *p.p.* (with *Thuidium urceolatum*), 17582 *p.p.* (with *Thuidium urceolatum*).—This species was overlooked in the recent survey of the Jamaican moss flora by Crum and Bartram (1958), and it is not to be found in Mitten's "Musci Austro-americani" (1869) or in Brotherus' "Musci" in *Die natürlichen Pflanzenfamilien* (1925). It appears in Paris' *Index Bryologicus* (1905) and in Jaeger and Sauerbeck's "Adumbratio" (1877) under *Lepidopilum*. An examination of the type shows that it has nothing to do with the Hookeriaceae,

but is rather a species of *Sematophyllum*, belonging to the weakly segregated genus, *Rhaphidorrhynchium*. Jaeger's inclusion of the species in *Lepidopilum* can be traced perhaps to Müller's *Synopsis*, where, in vol. 2, pp. 200-201, it is given under *Hookeria* as a species of uncertain relationship with the annotation that it may be a *Lepidopilum*.

Schwaegrichen (1830) said of the species: "In Jamaica lectam quondam sine nomine misit Ol. Swartz." His illustrations are not very convincing and are as suggestive of *Lepidopilum* as many other genera; his comparison of this species with *Hookeria praelongum* W.-Arnott. is very far fetched indeed. The fragmentary type is mounted on a sheet with *Callicostella depressa* (left) and *Taxithelium planum* (center). The remaining species (right) conforms rather well with the original description and is the only species present with the essential feature of falcate leaves. It is a fairly common species in Jamaica and has passed under a much later name, *Sematophyllum insularum* (Sull.) Mitt. All the Jamaican specimens at the National Museum of Canada can be referred here, and there is little doubt that the name *S. insularum* can be entirely replaced at least as far as the Jamaican flora is concerned. Both *S. insularum* and *S. xylophyllum* Mitt., based on Cuban types and widespread in tropical America, are almost certainly synonyms of *S. swartzii*. Mitten's descriptions suggest no real differences; in *S. insularum* the leaf margins are (in translation) "narrowly plane," and the perichaetial bracts subentire, whereas in *S. xylophyllum* the leaf margins are recurved below, and the perichaetial bracts are serrulate. These differences seem trivial, and examination of many specimens under both names shows considerable variation in most respects. Some leaves in the type of *S. swartzii* have very slightly recurved margins; no perichaetia were seen in the type of *S. swartzii*, but Schwaegrichen described the bracts as entire. Thus, the species seems to fall into a limbo between *S. insularum* and *S. xylophyllum* and further contributes to the doubt that any real distinction exists between them.

Acroporium jamaicense Crum & Bartr. On logs, 1000-2000 ft. alt. Portland: John Crow Mts., SW. of Ecclesdown, *Welch* 17545, 17738 *p.p.* (with hepatics).

Acroporium pungens (Hedw.) Broth. On tree trunks and logs, mist forest, 4000-4800 ft. alt. St. Andrew: Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17776, 17836, *Yuncker* 17559 *p.p.* (with *Mittenothamnium reptans*). Portland: Along trail, N. of Hardwar Gap, *Welch* 17576 *p.p.* (with hepatics), 17581 *p.p.* (with *Thuidium urceolatum*), 17588, 17611 *p.p.* (with *Rhizogonium spiniforme*), *Yuncker* 18508 *p.p.* (with *Macromitrium cirrosum*), 18509, 18510.

Taxithelium planum (Brid.) Mitt. On tree trunks, rotten logs, soil, and limestone, 500-2700 ft. alt. St. Catherine: Between Point Hill and Juan de Bolas, *Yuncker* 18390 *p.p.* (with *Vesicularia crassicaulis*). Portland: John Crow Mts., SW. of Ecclesdown, *Potzell*, March 30, 1958, *Welch* 17681 *p.p.* (with *Calymperes emersum*), 17699. St. Thomas: Along Sulphur River, Bath Fountain, *Welch* 17677.

Glossadelphus truncatulus (C.M.) Fl. In splash from waterfall, mist forest, ca. 4000 ft. alt. Portland: Near waterfall, along trail, below Hardwar Gap, *Welch* 17594A.

Ectropothecium apiculatum (Hornsch.) Mitt. On tree trunk, rotting log, and limestone, 1000-2700 ft. alt. St. Catherine: Between Point Hill and Juan de Bolas, *Yuncker* 18391. Portland: John Crow Mts., SW. of Ecclesdown, *Potzell*, March 30, 1958, *Welch* 17724.

Isopterygium subtenerrimum (Hampe ex C.M.) Par. On log, buttress

of tree, and limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17542, 17560 *p.p.* (with *Callicostella depressa*), 17715, 17732 *p.p.* (with *Octoblepharum albidum*), 17738 *p.p.* (with hepatics).

ISOPTERYGIUM TENERUM (Sw.) Mitt. On base of palm and on log, 500-2000 ft. alt. ST. MARY: Castleton Botanical Garden, *Welch* 17743. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17707, 17721.

VESICULARIA CRASSICAULIS (Mitt.) Broth. On rotting logs, soil, and limestone, 500-2700 ft. alt. ST. ANDREW: Hope Botanical Garden, *Welch* 17858. ST. CATHERINE: Between Point Hill and Juan de Bolas, *Yuncker* 18390. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17539 *p.p.* (with *Cyclodictyon varians*), 17540, 17557, 17686, 17703, 17708, 17715 *p.p.* (with *Isopterygium subtenerrimum*), 17717, 17718, 17727. ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17653, 17659, 17663.

VESICULARIA VESICULARIS (Schwaegr.) Broth. On log and limestone, 1000-2000 ft. alt. PORTLAND: John Crow Mts., SW. of Ecclesdown, *Welch* 17539 *p.p.* (with *Cyclodictyon varians*), 17547, 17549, 17556, 17727 *p.p.* (with *V. crassicaulis*).

MITTENOTHAMNIUM DIMINUTIVUM (Hampe) Britt. On limestone, in forest, ca. 500 ft. alt. ST. THOMAS: Along Sulphur River, Bath Fountain, *Welch* 17661 *p.p.* (with *Thuidium involvens*).

MITTENOTHAMNIUM LANGSDORFII (Hook.) Card. On rotten log, ca. 5000 ft. alt. ST. ANDREW: Cinchona, *Yuncker* 18662.

MITTENOTHAMNIUM REPTANS (Hedw.) Card. On rotten log, mist forest, alt. ca. 4500 ft. ST. ANDREW: Near summit of Mt. Horeb, E. of Hardwar Gap, *Yuncker* 17559.

POGONATUM FLEXUOSUM (C.M.) Broth. On soil, mist forest, ca. 5000 ft. alt. ST. ANDREW: Between St. Helen's and Morce's Gaps, *Yuncker* 18700.

POGONATUM TORTILE P.-B. On soil, mist forest, 4000-4800 ft. alt. ST. ANDREW: Hardwar Gap, *Welch* 17604 *p.p.* (with *Polytrichum juniperinum*); Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17781; near Hardwar Gap, *Yuncker* 17569. PORTLAND: Along trail, N. of Hardwar Gap, *Welch* 17587.

POLYTRICHUM JUNIPERINUM Hedw. On soil, mist forest, 4000-4800 ft. alt. ST. ANDREW: Hardwar Gap, *Welch* 17604, 17789 *p.p.* (with *Breutelia jamaicensis*), *Yuncker* 18507; Fairy Glade, above Hardwar Gap, Mt. Horeb, *Welch* 17842.

LITERATURE CITED

BARTRAM, E. B. 1928. Costa Rican mosses collected by Paul C. Standley in 1924-1926. Contr. U. S. Nat. Herb. 26(3): i-x, 51-114. *Fig.* 1-39.

BROTHERUS, V. F. 1893-1909. Musci. *In* Engler & Prantl, Die natürlichen Pflanzenfamilien. Vol. 1(3). Leipzig.

———. 1924-25. Musci. *In* Engler & Prantl, Die natürlichen Pflanzenfamilien. Ed. 2. Vol. 10-11. Leipzig.

CRUM, H. & E. B. BARTRAM. 1958. A survey of the moss flora of Jamaica. Bull. Inst. Jamaica, Sci. Ser. 8: 90 pp., *fig.* 1-25.

GROUT, A. J. 1937. Moss Flora of North America North of Mexico. Vol. I, *Campylopus*. Newfane, Vt.

JAEGER, A. & F. SAUERBECK. 1870-80. Genera et species muscorum systematice disposita, seu Adumbratio florae muscorum totius orbis terrarum. Ber. St. Gall. Naturw. Gesell. 1869-70: 245-299 (1870); 1870-71: 357-451 (1872); 1871-72: 309-490 (1873); 1872-73: 62-236 (1874); 1873-74:

53-278 (1875); 1874-75: 85-188 (1876); 1875-76: 201-371 (1877); 1876-77: 211-454 (1878); 1877-78: 257-514 (1879); 1878-79: 213-252 (1880).

KOCH, L. F. 1957. Louisiana muscology. 2. The herbarium of Tulane University, New Orleans. Brittonia 9: 69-71.

MITTEN, W. 1869. Musci austro-americani. Enumeratio muscorum omnium austro-americanorum auctori huisque cognitorum. Jour. Linn. Soc. London, Bot. 12: 1-659.

MÜLLER, C. 1848-51. Synopsis Muscorum Frondosorum Omnium Hucusque Cognitorum. Vol. 1-2. Berlin.

PARIS, E. G. 1903-05. Index Bryologicus, sive Enumeratio muscorum ad diem ultimam anni 1900 cognitorum adjunctis synonymia distributioneque geographica locupletissimis. Ed. 2. Vol. 1-5. Paris.

SCHWAEGRICHEN, F. 1811-42. Joannis Hedwig Species Muscorum Frondosorum descriptae et tabulis aeneis coloratis illustratae opus posthumum. Supplementa I-IV. Leipzig.

WHITEHOUSE, EULA & F. MCALLISTER. 1954. The mosses of Texas. A catalogue with annotations. The Bryologist 57: 63-146.

WILLIAMS, R. S. 1913. Dicranaceae. No. Amer. Flora 15(2): 77-158.

NOTES ON THE BRYOPHYTES OF SOUTHWEST MISSOURI. II.

FRUITING *AMBLYSTEGIUM LAXIRETE*.

PAUL L. REDFEARN, JR.[1]

Amblystegium laxirete Card. & Thér. has recently been considered a valid species distinct from *A. riparium* (Hedw.) BSG by Gier (1955), Welch (1957), and Conard (1959). A recent collection of *A. laxirete* (*Redfearn* 4124, Greene Co.) was identified by Dr. Conard, who called my attention to the fact that this collection was the first he knew of that contained fruiting plants. Since then I have also discovered that this species was collected earlier with fruiting plants by L. J. Gier (No. 6977) at Roaring River State Park in Barry Co.

DESCRIPTION OF FRUITING STRUCTURES (*Fig.* 1-8). Outer perichaetial leaves triangular-ovate, spreading from middle, 0.8-1.2 mm. long, 0.4-0.8 mm. wide, costa strong, usually ending near middle of leaf; inner perichaetial leaves broadly ovate-lanceolate, erect, 1.8-2.3 mm. long, 0.6-0.8 mm. wide, costa very strong, usually ending near base of acumen, median leaf cells linear-rhomboid, prosenchymatous, usually 5-8:1, occasionally longer,

[1] Dept. of Science, Southwest Missouri State College, Springfield, Mo. This study was aided by a grant from the Sigma Xi-RESA Research Fund.

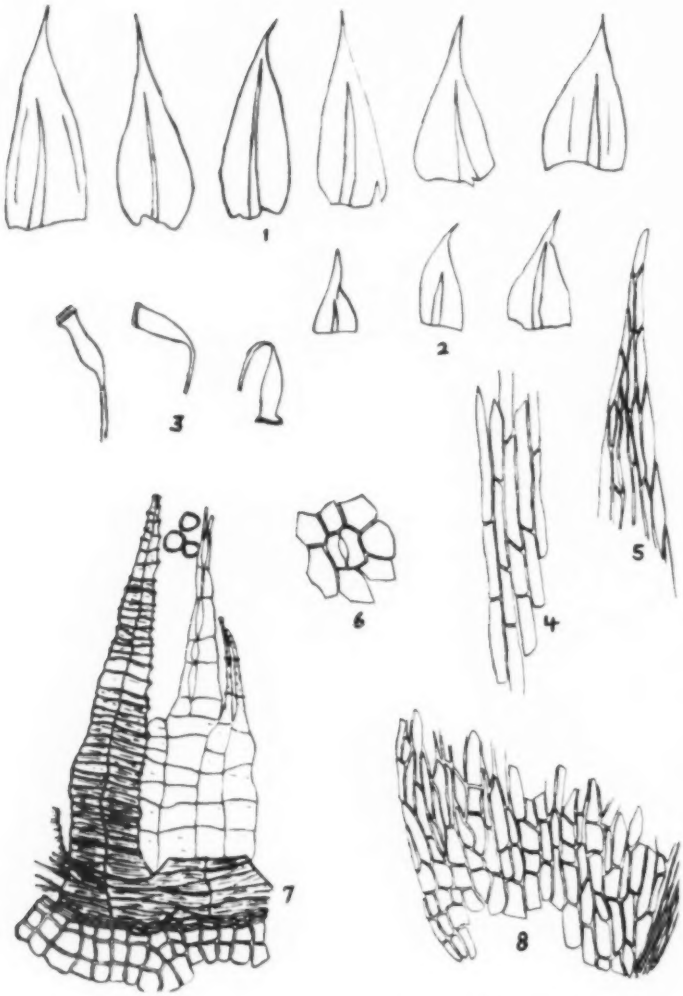

FIG. 1-8. *Amblystegium laxiretc*. 1. Inner perichaetial leaves, × 19. 2. Outer perichaetial leaves, × 19. 3. Capsules, × 3. 4. Median leaf cells of inner perichaetial leaf, × 168. 5. Apex of inner perichaetial leaf, × 168. 6. Stoma, × 168. 7. Peristome, × 168. 8. Basal cells of inner perichaetial leaf, × 168.

walls thin, basal cells shorter, densely chlorophyllose, margins plane, entire or minutely serrulate at apex.

Capsule light brown to yellowish brown, darker with age, inclined; urn up to 3 mm. long, 1.2 mm. in diameter, not strongly arcuate or contracted below mouth when dry and empty, cells of exothecium generally parenchymatous, those beneath the peristome smaller and transversely elongate; seta up to 2.4 cm. long, light yellow or brown above, becoming purple below; stomata present at base of urn; peristome teeth 16, brownish to yellow-orange at base, paler above becoming hyaline at tip, transversely striate in lower half, distinctly serrate in upper third, papillose above, united near base; segments about as long as teeth and alternating with them, hyaline, carinate, split along keel, papillose, basal membrane about ½ as long as segments; cilia 1-4, slender, nodulose or appendiculate, equalling the segments, often appearing shorter due to fragmentation; operculum and calyptra not observed; spores in spring, 14-23 μ in diameter.

Discussion. The fruiting structures of *A. laxirete* appear to be similar in many ways to those described for *A. riparium* by Cheney (1897). However, after comparison of the fruiting structures of *A. laxirete* with authentic *A. riparium* lent me by Dr. Conard, I have concluded that *A. laxirete* differs from *A. riparium* in the following ways: the perichaetial leaves are generally more broadly ovate-lanceolate, possess a stouter costa, and generally have shorter median leaf-cells; the capsule appears somewhat longer, up to 3 mm. long, and certainly does not tend to become as strongly arcuate and contracted below the mouth when dry and empty. In the final analysis, the validity of these differences will rest with the collection of more fruiting material of *A. laxirete*.

Literature Cited

Cheney, L. S. 1897. North American *Amblystegium*. Bot. Gaz. 24: 235-291.

Conard, H. S. 1939. *Amblystegium*. The Bryologist 62: 96-104. *Fig.* 1.

Grier, L. J. 1955. Missouri bryophytes. Trans. Kans. Acad. 58: 24-49.

Welch, Winona H. 1957. Mosses of Indiana. An Illustrated Manual. 478 pp. 251 fig. Indianapolis.

SYRRHOPODON PARASITICUS IN THE SOUTHERN UNITED STATES

WILLIAM D. REESE[1]

Syrrhopodon parasiticus is an extremely interesting moss which, although widely distributed in the southern United States, occupies a rather restricted type of habitat. It was considered for many years to be quite rare, but as the numerous collections of recent years indicate it is relatively easy to find once its habitat requirements are known. A second name, *S. filigerus*, has been applied irregularly to narrow-leaved or juvenile plants of *S. parasiticus*; as will be shown below, it is to be considered as a synonym. I wish to express my appreciation to the individuals and institutions who so kindly made specimens available for this study.[2]

SYRRHOPODON PARASITICUS (Sw.) Besch. Ann. Sci. Nat., 8, 1: 298. 1895. *Encalypta parasitica* Sw. Prodr. Fl. Ind. Occ. 3: 1759. 1806. *Calymperes parasiticum* (Sw.) Hook. & Grev. Brewst. Edinb. Jour. Sci. 1: 131. 1824. *C. disciforme* C. M. Linnaea 21: 183. 1848. *C. filigera* Aust. Bot. Gaz. 4: 151. 1879. *Syrrhopodon filigerus* (Aust.) Williams, Bull. Torrey Bot. Club 47: 384. 1920. *Calymperopsis parasitica* (Sw.) Broth. *in* Engler & Prantl, Die nat. Pflanzenf. Ed. 2. 10: 235. 1924. Additional synonomy of this often displaced species is listed by Lindberg (1864).

The type of *S. parasiticus* (*Swartz*, Hispaniola) is at Geneva and has been studied in the United States by Britton (1913). I have examined two leaves of the type which are preserved in the Mitten Herbarium at the New York Botanical Garden. After a study of the type (a single plant, also at the New York Botanical Garden) of *Calymperes filigera* Aust. (*J. D. Smith & C. F. Austin*, Caloosa, Florida, March 1878), I can find no reasons for maintaining the name as distinct. Austin's scanty description of *C. filigera* differentiates it from *C. disciforme* (= *Syrrhopodon parasiticus*) by its having "much narrower leaves, with filaments borne on the costa from middle to apex." However leaves exactly matching those of the type of *C. filigera* can be found low on the stems of typical plants of *Syrrhopodon parasiticus* and on young plants growing in the same clump. It is also worth noting that at the same time and in the same area that the type of *C. filigera* was

[1] Dept. of Biology, Southwestern Louisiana Institute, Lafayette, La.

[2] E. B. Bartram; The New York Botanical Garden; Duke University; United States National Herbarium; Farlow Herbarium, Harvard University; National Museum of Canada; University of Michigan; Chicago Natural History Museum; Florida State University.

collected, abundant collections of *Syrrhopodon parasiticus* (called at the time *Calymperes disciforme*) were made. It seems safe to conclude that the type of *C. filigera* is a juvenile plant of *Syrrhopodon parasiticus*.

Apparently the first published reference to this species in the United States was made by C. F. Austin (1879) when he wrote in the Botanical Gazette: "*Calymperes disciforme* C. Müll. with the upper leaves very broad and bearing filaments on the costa was also found sparingly on the Caloosa." On the same page Austin "provisionally" described *C. filigera* as a new species which may indicate that he had reservations as to its distinctness as a species or merely that he was unsure that it properly belonged in the genus *Calymperes*.

Lesquereux and James' *Manual* in 1884 included *C. disciforme* from Caloosa but did not mention *C. filigera*. Apparently it was overlooked as the name is not even mentioned as a synonym.

Next R. S. Williams (1920) in his revision of the North American species of Calymperaceae made the combination *Syrrhopodon filigerus* and pointed out, under *Calymperes disciforme*, that Florida specimens under that name were misidentified and actually were either *C. richardii* C. M. or *Syrrhopodon filigerus*. The *Calymperes disciforme* reported by Austin from Caloosa and included by Lesquereux and James in their *Manual* was, from the description, undoubtedly *Syrrhopodon parasiticus*. Therefore, up to the time of Williams' revision, there existed only one locality in the U. S. for *Syrrhopodon parasiticus*, Caloosa, Florida, and the only specimens seem to have been those of Smith and Austin, some of which had been called *C. filigera* sp. nov. and the rest *C. disciforme*.

In 1923, in *The Bryologist* (the illustration on p. 50), Williams reported *Syrrhopodon parasiticus* as a new discovery in the U. S., and since that time numerous other collections have been made in Florida, particularly in the northern part of the state, appearing under the names of both *S. parasiticus* and *S. filigerus*. The most significant collections in Florida have been made by S. Rapp, A. J. Grout, Ruth S. Breen and her students at Florida State University, and more recently L. E. Anderson and H. A. Crum.

The appearance[3] of the plants is quite distinctive, enabling one, as pointed out by Britton (1924), to pick them out very readily in the field by the involute and incurved leaves with the shiny, dorsal surface of the costa very conspicuous. The leaves are usually not much contorted but are often secund, especially on the

[3] For a full description of the species see Steere (1937).

larger plants. The plants are dark green and stand out from the substrate, to which they are attached only by their bases.

The plants fruit only irregularly in southern Florida and not at all in the rest of their range in the U. S. Reproduction is most commonly carried out by means of the propagula which are long, filiform structures produced on the ventral surface of the costa and found in great abundance on the broadened, upper leaves of the larger plants. Similar structures are formed in equal abundance by most other members of the Calymperaceae. The terminal leaves of the larger plants are greatly broadened and when moist form a rosette. It is probable that the formation of the rosette indicates a cessation of growth for a period. New growth is initiated through the center of the rosette, and the larger plants may have several old rosettes scattered along the stem, each made up of the very broad and shortened leaves. The new stem which arises from the rosette is equipped with rhizoids at the base, and since these innovations seem to break off easily it may be that they also serve as propagula of a sort. Holzinger (1923) commented on the propagula, and Britton (1924) reported the first discovery of a fruiting specimen in the U. S.

The plants occur mostly in very easily recognizable habitats: almost always on bark and either over muddy or wet soil or litter, above streams, or over areas subject to fairly frequent flooding. Further, the areas in which the plants reach their best development are always deeply shaded and are generally of such a nature that there will be little wind activity and cool, moist air can accumulate—a rather sheltered type of habitat, in other words. Examples of such habitats include the interior of bay-titi-*Sphagnum* bogs, wooded ravines with streams along the bottoms, low, wet woods, wooded swamps, the interior of the hammocks in southern Florida, wooded sides of lime sinks, boggy spring heads and wooded river banks.

The substrate is almost invariably the bark of living trees and shrubs. Occasional plants are found on dead bark but in such cases are only loosely attached and obviously about to fall. It is assumed that such plants have persisted since the bark was alive. Bark which is smooth or nearly so is essential for the establishment and best growth of the plants. Colonies are found commonly on the smooth bark of twigs of a live oak, for example, but only rarely on the rough, fissured bark elsewhere on the tree. I have seen specimens growing on the following woody plants: *Acer* sp., *Carpinus caroliniana* Walt., *Carya* sp., *Fagus grandifolia* Ehrh., *Fraxinus* sp., *Ilex opaca* Ait., *I. vomitoria* Ait., *Illicium floridana* Ellis, *Ligustrum lucidum* Ait., *Magnolia grandiflora* L., *M. virginiana* L.,

Myrica sp., *Nyssa* sp., *Ostrya virginiana* (Mill.) K. Koch, *Planera aquatica* Gmel., *Quercus hemisphaerica* Bartr., *Q. nigra* L., *Q. virginiana* Mill., *Q.* sp., *Vaccinium* sp., and *Viburnum* sp. Of nine specimens collected recently in eastern Texas, four were growing on *Ilex opaca*, two on *Carpinus caroliniana*, two on *Acer* sp., and one on *Magnolia virginiana*. Undoubtedly there are many other trees and shrubs on which the moss may be found.

Most specimens are found at a height of two to six feet above the ground, although a few collections have been made at heights up to 18 feet.

Almost always the plants are found in pure stands. In fact, it appears from my observations that the plants are pioneer inhabitants of smooth, bare bark and are smothered out by secondary invaders such as *Forsstroemia trichomitria* (Hedw.) Lindb., *Leucodon julaceus* (Hedw.) Sull., and others of a similar nature. The usual mode of growth is for the plants to occur singly in small colonies or in tufts and clumps of a few plants. Occasionally small, dense cushions or mats of young plants are found, covering an area on the bark about 1 sq. cm. Since the plants do not branch much as a rule, the colonies never get very dense.

Until now, to my knowledge, no collections have been reported from the United States outside of Florida, and only a few years ago the majority of the collections were from the southern portion of Florida only. This report is written in part to allow the publication of various range extensions and new state records. The records enumerated below extend the known range of *Syrrhopodon parasiticus* about 450 miles to the west.

ALABAMA: Choctawhatchee River, ca. 1 mi. S. of Geneva, Geneva Co., *Reese* 836. Vicinity of US 90, 6 mi. E. of jct. with US 31, Baldwin Co., *Reese* 1797. Ca. 4 mi. S. of Ozark, along US 231, Dale Co., *R. A. Pursell* 3397. GEORGIA: Near the Suwanee River, S. of Fargo on US 441, Clinch Co., *Reese* 983. LOUISIANA: SE. side of Weeks Island, Iberia Parish, *Reese* 1676. Ca. 5 mi. NW. of Turkey Creek, Evangeline Parish, *Reese* 1538. ½ mi. N. of Moss Bluff, ca. 2.5 mi. N. of Lake Charles, Calcasieu Parish, *Reese* 1703. 8.6 mi. E. of Longville, Beauregard Parish, *Reese* 1703. MISSISSIPPI: Along US 90, 5.9 mi. E. of state line and 2.7 mi. W. of jct. of US 90 and Miss. 43, Hancock Co., *Reese* 1819. TEXAS: 10 mi. E. of Vidor on US 90, Orange Co., *Reese* & *Pursell* 2199. W. side of US 96, ca. 5 mi. S. of Sillsbee, S. bank of Village Creek, Hardin Co., *Reese* & *Pursell* 2209. Vicinity of Bracken Cemetery, ca. 1 mi. SW. of Honey Island, Hardin Co., *Reese* & *Pursell* 2234. 7.7 mi. W. of Honey Island along Tex. 1293, Hardin Co., *Reese* & *Pursell* 2236, 2240. 1.5 mi. N. of Votaw, Hardin Co., *Reese* & *Pursell* 2245. "Magnolia Hills" road, 2.5 mi. W. of Woodville on US 190, Tyler Co., *Reese* & *Pursell* 2269. ¼ mi. E. of Neches River on US 190, Jasper Co., *Reese* & *Pursell* 2276. Tex. 87, 5.3 mi. N. of jct. with Tex. 235, Newton Co., *Reese* & *Pursell* 2283.

From my observations and collections of this species I would conclude that rather than being a rare and relatively recent invader of the United States from the south, as Schornherst (1943) has postulated on the basis of the then relatively few and localized collections, it is an old, well established, and fairly common member of the bryophyte flora of the Gulf Coast region and almost certainly has a continuous distribution through Texas and into Mexico. A search of suitable habitats across the coastal plain of Texas should confirm this hypothesis, which is made both in the light of the extension of the known range and because of the ease with which the plants are found whenever the proper habitat is carefully searched, thus indicating a very general, but never very dense distribution. The species is otherwise known from the West Indies, Brazil, Galapagos Islands, Central America and Mexico.

LITERATURE CITED

AUSTIN, C. F. 1879. Some new Musci. Bot. Gaz. 4: 150-152.

BRITTON, E. G. 1913. West Indian Mosses. Bull. Torrey Bot. Club 40: 653-676.

———. 1924. *Syrrhopodon parasiticus* (Schwgr.) Besch. THE BRYOLOGIST *27*: 34-35.

HOLZINGER, J. M. 1923. Unusual provision for vegetative reproduction in *Syrrhopodon parasiticus*. THE BRYOLOGIST *26*: 47.

LESQUEREUX, L. & T. P. JAMES. 1884. Manual of the Mosses of North America. 447 pp. 5 pl. Boston.

LINDBERG, S. O. 1864. Uppställning af familjen Funariaceae. Öfv. Sv. Vet.-Ak. Forh. *21*: 589-608.

SCHORNHERST, RUTH. 1943. Phytogeographic studies of the mosses of northern Florida. Amer. Midland Nat. *29*: 509-532.

STEERE, W. C. 1937. Calymperaceae. *In* Grout, Moss Flora of North America North of Mexico 1: 129-134.

WILLIAMS, R. S. 1920. Calymperaceae of North America. Bull. Torrey Bot. Club 47: 367-396.

———. 1923. *Syrrhopodon parasiticus* (Sw.) Besch. in Florida. THE BRYOLOGIST *26*: 46.

THE STATUS OF CALLIERGON SUBSARMENTOSUM

HAROLD ROBINSON[1]

In the *Moss Flora of North America* Grout stated that *Calliergon subsarmentosum* Kindb. was only a slight variation of *C. sarmentosum* and included it in that species without even varietal

[1] Dept. of Botany, Duke University, Durham, N. C.

recognition. Recent examination of some Pleistocene material and a study of the material in the Grout slide collection has shown *C. subsarmentosum* to possess a number of distinct characters.

The material examined by Grout was collected by Macoun on July 13, 1906 on Vancouver Island, British Columbia. Grout noted the enlarged alar cells extending nearly to the costa and the lack of an apiculus at the tip of the leaf. However, perhaps owing to the existence of only one such specimen, he did not consider it distinct from *C. sarmentosum*. Further material comparing favorably in all characters with the Vancouver Island collection has been obtained with a group of fossil mosses from "Weber Lake," Lake County, Minnesota collected by Magnus Fries.

According to information kindly furnished by Magnus Fries, Weber Lake is located about one mile south of the Mt. Weber lookout tower and in the so-called Toimi drumlin area. The moss fragments were deposited or washed together in a bottom silt layer about seven meters below the sediment surface and eight meters below water level. Pollen analysis, according to Dr. Fries, seems to indicate a late-glacial age (up to about 10,000 B. P.) and at least partly open landscape.

The lack of an apiculus on the leaf is a character to be used with caution. *Calliergon sarmentosum* when examined often lacks an apiculus either by failure to form one or more often by being broken off or abraided. The apiculus, nevertheless, is apparent on at least some leaves of any specimen. In the case of *C. subsarmentosum* no apiculus has been observed in either the Vancouver Island or the Minnesota material. At most the leaf tips are often narrowed to a somewhat blunt point.

Far more distinctive, the alar cells of *C. subsarmentosum* are as Grout observed, with, moreover, a very sharp line of demarcation between the inflated cells and the narrow cells of the lamina. This contrasts greatly to the gradation in *C. sarmentosum* with an area of quadrate cells between.

The primary distinctions between the two species might be summarized as follows:

C. sarmentosum	*C. subsarmentosum*
1. Enlarged alar cells separated from the costa by a region of small, somewhat incrassate, and often reddish cells.	1. Enlarged alar cells reaching or nearly reaching the costa.
2. Enlarged alar cells separated from the spindle-shaped laminar cells by an area of intermediate and usually rather quadrate cells.	2. Enlarged alar cells separated from the laminar cells by only a few very small short cells.
3. Leaf tips usually apiculate.	3. Leaf tips not apiculate.

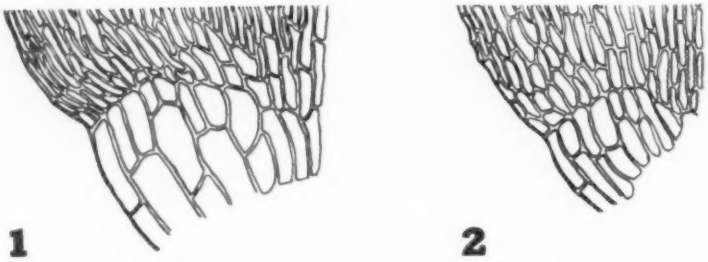

FIG. 1. *Calliergon subsarmentosum* Kindb. Alar cells. *2. C. sarmentosum* (Wahlenb.) Kindb. Alar cells.

Calliergon subsarmentosum appears to be completely distinct from *C. sarmentosum*. Its single Recent collection site on the West Coast of North America, in view of its Pleistocene remains in Minnesota, appears to represent a relict station of a previously much more widely distributed species.

A SMALL COLLECTION OF WEST JAVANESE MOSSES

HOWARD CRUM[1]

In December of 1958 Ross G. Robbins made a modest but selective collection of mosses in West Java. Most of his collections were made on Mt. Gedeh, which is bryologically one of the best known areas in the tropics, largely owing to Max Fleischer's masterful treatment of the Musci in *Die Flora von Buitenzorg*. Because of a dearth of ecological data, additional records of even the most common tropical mosses are often of interest. This list of 32 species includes two species apparently new to the flora of Java (*Brachythecium flagellare* and *Mniomalia semilimbata*) and thus points up the fact that even this flora, well known as it is, justifies further collection and study.

Complete series of the specimens listed below are to be found in Mr. Robbins' private herbarium in Canberra and at the National Museum of Canada (Ottawa) and the Commonwealth Scientific and Industrial Research Organization (Canberra).

1. Lower montane rain forest, 5000-6000 ft. alt., Tjibodas, Mt. Gedeh, residency of Buitenzorg, West Java, Dec. 16, 1958.

[1] National Museum of Canada, Ottawa.

Sphagnum junghuhnianum Dozy & Molk. Terrestrial, 6000 ft. (1917).
Fissidens anomalus Mont. Terrestrial, 5500 ft. (1903).
Dicranoloma reflexifolium (C.M.) Par. Terrestrial (1923).
Leucobryum javense (Brid.) Mitt. Corticolous, 6000 ft. (1897).
Leucobryum scalare C.M. Epixylic (1924).
Pseudosymblepharis angustata (Mitt.) Hilp. Epixylic, 6000 ft. (1913).
Brachymenium nepalense Hook. Corticolous, 5500 ft. (1930).
Rhodobryum giganteum (Hook.) Schimp. Terrestrial, 5500 ft. (1904).
Rhizogonium spiniforme (Hedw.) Bruch. Terrestrial and corticolous, 5500 ft. (1914, 1926).
Mniodendron divaricatum (Hornsch. & Reinw.) Lindb. Terrestrial, 5500 ft. (1907).
Macromitrium angustifolium Dozy & Molk. Corticolous (1925).
Macromitrium fasciculare Mitt. Corticolous (1928).
Macromitrium ochraceum (Dozy & Molk.) C.M. Terrestrial (1916).
Rhacopilum cuspidigerum (Schwaegr.) Mitt. Epixylic (1915 *p.p.*, with *Pleuropus fenestratus*).
Papillaria leuconeura (C.M.) Jaeg. Pendant from branches, 5500 ft. (1922).
Meteorium miquelianum (C.M.) Fl. Corticolous (1899).
Barbella javanica (Dozy & Molk.) Broth. Pendent from branches, 5000 ft. (1909).
Homaliodendron scalpellifolium (Mitt.) Fl. Corticolous, 6000 ft. (1898).
Thuidium cymbifolium (Dozy & Molk.) Dozy & Molk. Terrestrial and corticolous, 5000-5500 ft. (1896 *p.p.*, with *Ectropothecium buitenzorgii*, 1929).
Pleuropus fenestratus Griff. Epixylic (1915). Fleischer in *Die Flora von Buitenzorg* cited a single collection, from East Java.
Brachythecium flagellare (Hedw.) Jenn. Terrestrial, 5500-6000 ft. (1906, 1916). This cosmopolitan species was not previously known to occur in Java.
Erythrodontium julaceum (Hook.) Par. Corticolous, 5000 ft. (1911)
Acroporium diminutum (Brid.) Fl. Corticolous, 6000 ft. (1908).
Acroporium lamprophyllum Mitt. Terrestrial and epixylic (1900, 1902), 1919).
Taxithelium lindbergii (Dozy & Molk.) Ren. & Card. Epixylic, 5500 ft. (1901).
Glossadelphus glossoides (Dozy & Molk.) Fl. Corticolous, 5500 ft. (1905).
Ectropothecium buitenzorgii (Bel.) Jaeg. Corticolous, saxicolous, terrestrial, and epixylic, 5000-5500 ft. (1896, 1910 *p.p.*, with *Macrothamnium macrocarpum*, 1921).
Macrothamnium macrocarpum (Reinw. & Hornsch.) Fl. Terrestrial and epixylic, 5000-5500 ft. (1910, 1912).
Pogonatum teysmannianum (Dozy & Molk.) Dozy & Molk. Terrestrial, 5500 ft. (1920).

II. Coastal forest, Udjong Kulon game reserve, island of Palau Teutjang, Sunda Straits, West Java, Dec. 19, 1958.

Muiomalia semilimbata (Mitt.) C.M. Corticolous (1932). This appears to be the first Javanese record for this interesting and distinctive species which was already known, however, from East Sumatra, just across the Sunda Straits.
Taxithelium nepalense (Schwaegr.) Broth. Corticolous and epixylic (1932 *p.p.*, with *Muiomalia semilimbatus*, 1933).

III. Coral outcrop, coastal forest, Cape Lajar, West Java, Dec. 20, 1958.

Brachymenium indicum (Dozy & Molk.) Dozy & Molk. Terrestrial (1931).

FRULLANIA TENERA

LOIS CLARK[1]

Frullania tenera Spruce, Trans. and Proc. Bot. Soc. Edinburgh 15: 23. 1884. Plants large, delicate, pale green or rarely olive-green, or red, pellucid, flaccid, creeping on bark. Leafy stem to 4 cm. long, 1-1.5 mm. wide; stem light brown, brittle, pinnate or bipinnate, sparingly and irregularly branched; primary branches few, branches on same side of stem mostly 5-6 leaves apart; cross-section of stem about 210 μ in diameter; cortex of 2 layers of thick-walled cells; interior cells slightly smaller, 13-19 μ, or some up to 34 μ. Stem leaves somewhat imbricate, unequally bilobed. Dorsal lobe of stem leaf more or less erect-spreading, obliquely asymmetric, semi-cordate, oblong, 0.85-1.4 mm. long from mid-point of attachment, 9.0-1.16 mm. wide; apex obtuse to rounded, decurved; margins entire; dorsal margin crossing stem to 1/2 stem width beyond; dorsal base cordate. Cells of stem leaves at apex and margin averaging 17 μ in diameter; median cells averaging 27 μ; basal cells 25-42 μ; trigones distinct throughout, triangular, larger toward base; walls thick, more or less pellucid; intermediate thickenings present in most cells. Ventral lobe of stem leaf very large, about 2/3 area of dorsal lobe, nearly parallel with stem, upper part saccate, lower part expanded; saccate portion much wider than high, arched upward, ending in a lateral, downward-curved, tubular, cucullate beak, rarely evolute except on fruiting branches; expanded portion extending well below dorsal lobe, longer than wide, mostly somewhat wide and rounded below, 0.75-1 mm. × 0.325-0.5 mm.; margin entire or the outer slightly sinuate; on branches ventral lobe smaller, expanded portion narrowly ligulate. Stylus up to 9 cells long, 2 cells wide for about 3/4 the length; apex hyaline. Stem leaf subtending a branch symmetric, larger than adjacent stem leaves, auriculate, suborbicular, about 1.42 mm. × 1.28 mm.; auricles rounded, overlapping when leaf is spread out; ventral lobe large, partly saccate and partly explanate, on

[1] Dept. of Botany, University of Washington, Seattle, Wash. This work was made possible by a grant from the Biological and Medical Research Fund of the State of Washington.

branches the expanded portion short. First leaf of branch of 2 unequal, explanate lobes. Underleaves of stem subcontiguous, equal to or somewhat smaller than dorsal lobe of stem leaf, averaging 0.9 mm. long from mid-point of attachment and about 1.11 mm. wide, broadly orbicular or wider than long, bilobed 1/3 their length or slightly more; sinus acute to obtuse; lobes spreading, acute or rarely somewhat apiculate; margins sinuate to repand; base cordate, rounded and overlapping when underleaf is spread out. First underleaf of branch ovate; apex entire, acuminate. Plants bisexual. Male inflorescence terminal on stem or axillary branch, usually near female inflorescence, oblong or globose. Male bracts 3-8 pairs, almost equally bilobed; apex of lobes acute to acuminate; margins entire except for large tooth (stylus) on ventral margin of ventral lobe. Male bracteole oblong, basal one equally bilobed, upper ones smaller and unequally bilobed. Female inflorescence terminal on short branch or rarely on long one; involucre gradually grading from normal leaves through several modified whorls. Inmost bracts equal to or larger than stem leaves, in 3-4 pairs, unequally bilobed for 1/4 their length; dorsal lobe obovate, about 1.37 × 0.87 mm. wide, with apex abruptly acute to obtuse; ventral lobe somewhat smaller than dorsal, subrotund to cuneate when spread out, 1.28 × 0.93 mm. with apex acute to acuminate, canaliculate and recurved; margins entire except for large tooth (stylus) on inner margin. Female bracteole connate with both bracts for 3/4 its length, oblong to cuneate, averaging 1.35 × 0.87 mm., bilobed 1/9-1/10 its length; sinus acute; lobes to acuminate; margins entire. Perianth 1/3 emergent, oblong-ovoid to fusiform, 1.42 × 0.57 mm., 4-keeled to near base, rounded or retuse to beak; beak short, about 178 μ long and 114 μ wide.

HABITAT: On trees.

TYPE: Javapoto, Peruvian Andes.

RANGE: Mexico and Peru.

SPECIMENS EXAMINED: The two packets kindly lent by the Farlow Herbarium of Harvard University have no collection date, and their packet numbers were not definitely Spruce's. The packet marked "TYPE, 25701" apparently bears the herbarium number of F. Verdoorn. The second collection is from the same vicinity and bears the number 3368, which may be Spruce's number. Both collections are marked "Peruvian Andes, Javapoto." Confusion of the collector's number with other numbers is unfortunate.

Frullania tenera is a very variable species, its parts varying on the same and on different plants. The size of dorsal lobe, ventral lobe, and underleaves apparently varies with ecological conditions and also differs between stem and branch of the same plant. *F. tenera* is very similar in general appearance to *F. riojaneirensis* but

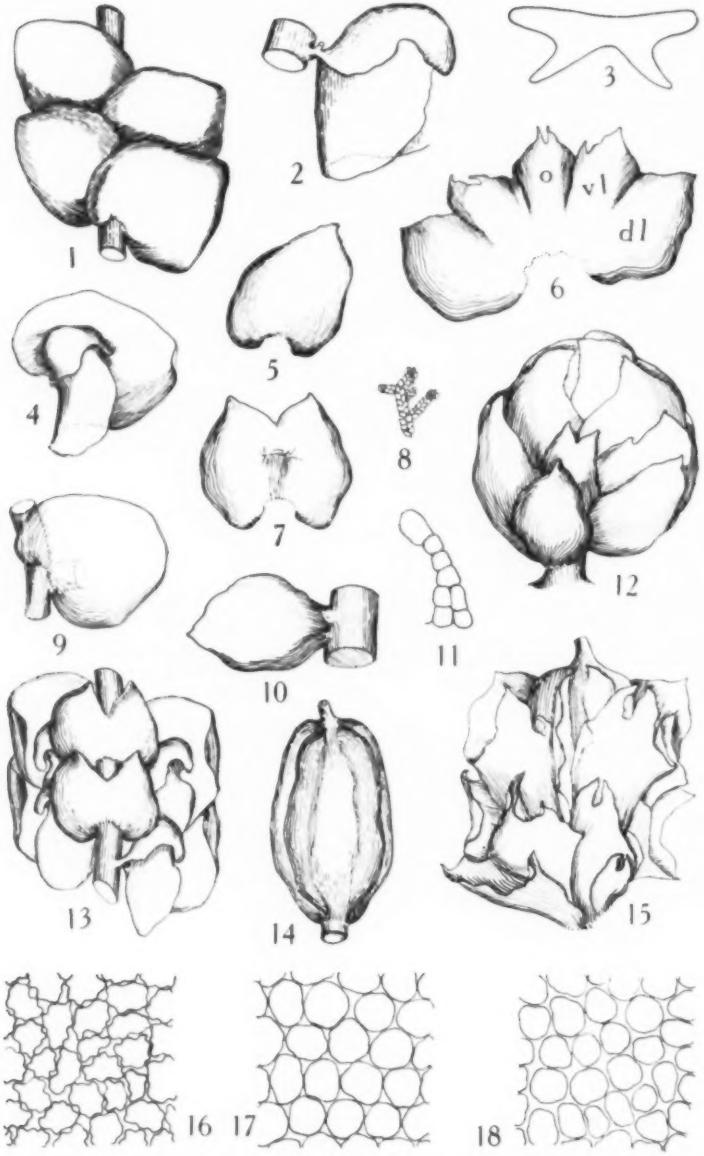

FIG. 1-18. *Frullania tenera*. 1. Part of plant, dorsal view, × 20. 2. Ventral lobe of leaf, × 42. 3. Cross-section of perianth (semi-diagrammatic),

differs from it in having dorsal lobes larger; ventral lobes somewhat broader, the saccate part of the ventral lobe broader, the plane portion wider in its lower half, and extending farther downward beyond the lower margin of the dorsal lobe; underleaves more deeply bilobed; and female bracts and bracteole united to 3/4 their length.

× 27. 4. Ventral view of stem leaf, × 17. 5. Dorsal view of stem leaf × 17. 6. Female involucre; *db*, dorsal lobe of bract; *vb*, ventral lobe of bract; *o*, bracteole, × 17. 7. Underleaf of stem, × 20. 8. Part of plant, × 1. 9. Dorsal view of leaf subtending branch, × 20. 10. First underleaf of branch, × 49. 11. Stylus, × 200. 12. Male inflorescence, ventral view, × 59. 13. Part of plant, ventral view, × 20. 14. Perianth, × 17. 15. Female inflorescence, ventral view, × 20. 16. Cells near tip of stem leaf, × 267. 17. Cells of leaf middle, × 267. 18. Cells near leaf base, × 267. (All drawings by Janet Fukuda from the packet marked TYPE.)

THE FEMALE INFLORESCENCE OF FRULLANIA PICTA

RUTH D. SVIHLA[1]

Heretofore *Frullania picta* Steph., has been described from sterile material (Stephani, Hedwigia 33: 166. 1894) and from male specimens (Svihla, The Bryologist 58: 72-76. 1955). Stephani's unpublished drawings of the female bracts which he erroneously ascribed to this species were discussed in the latter publication.

In March 1958, a mass of *Frullania*, No. 2914, was collected by the writer from a tree in the Botanical Garden of Singapore labeled *Casuarina* from Amboina. This proved to be *Frullania picta*, mostly male plants with female plants intermingled. The female inflorescence is described and figured here. It is interesting to note that Stephani based his original description of this species on specimens from Amboina. However he had only sterile material.

Female plants mostly with young inflorescences but some with mature ones, growing among a mass of male plants; similar to the male plants vegetatively except for stems and underleaves which measure somewhat smaller. The appendiculum between stylus and stem is less prominent on young plants than on those more mature but not different from those of the male plants. Female inflorescence terminal on main stem or branch. Below the perianth several successive whorls of leaves and underleaves grading downward into

[1] University of Washington, Seattle, Wash.

normal vegetative leaves. (We consider the involucre to be the first or innermost whorl of leaves below the perianth.) Dorsal lobe of female bract of involucre broadly ovate, averaging 731 μ long by 399 μ wide; apex obtuse to rounded; margin somewhat sinuate, sometimes with a very short, blunt tooth on upper margin. Ventral lobe united about 1/3 its length with the dorsal one, folded lengthwise, ovate when spread out, slightly smaller than dorsal one, averaging 705 μ long by 372 μ wide; apex acute to acuminate; margin ciliate-dentate. Bracteole free from bracts, ½- to ¾-bilobed, only slightly shorter than the bracts, narrowed to base, averaging 665 μ long by 399 μ wide; sinus narrow; lobes narrowly ovate to ovate-lanceolate, acuminate, upper margins coarsely and irregularly dentate becoming somewhat sinuate toward the base. Whorls below the involucre which are similar to but smaller than the involucre, grading successively downward into normal vegetative leaves. Stylus a row of 2 to 4 cells. Perianth very broadly obovate, averaging 665 μ long by 545 μ wide, smooth, with 3 rounded angles,

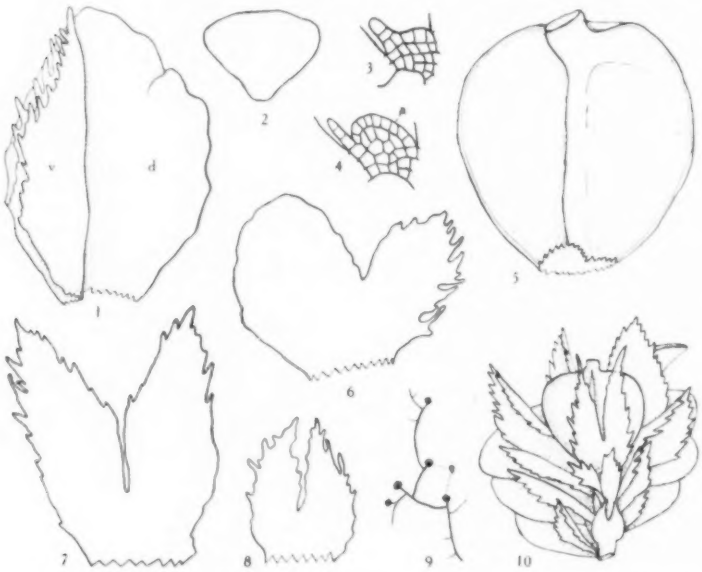

FIG. 1-10. *Frullania picta*, female plant. 1. Female bract, dorsal lobe (*d*), ventral lobe (*v*), × 61. 2. Cross-section of perianth, × 30. 3, 4. Stylus and appendiculum (*a*), × 145. 5. Perianth, × 61. 6. Bract of whorl below the involucre, × 61. 7. Bracteole, × 61. 8. Bracteole of whorl below the involucre, × 61. 9. Scheme of branching. 10. Female inflorescence, × 35. (All drawings by writer from *Stihla* 2914.)

rounded to beak; beak very wide and short, averaging 66.5 μ long by 196 μ wide.

SPECIMEN EXAMINED: Singapore, Botanical Garden, on *Casuarina* tree from Amboina, intermingled with male plants (*Szyhla 2914*), March 23, 1958.

REVIEWS

URSULA K. DUNCAN. *A Guide to the Study of Lichens.* xxvii + 164 pp. 18 pl. T. Buncle & Co. Ltd. Arbroath, Scotland. 1959. Price: 25 shillings (= $3.50). The inviting cosmopolitan title of this book might lead one to expect broader vistas than opening its nice binding actually brings into view. To avoid possible disappointment let us say at once that this book is addressed to British beginners who want to identify the lichens of their islands. It is an attempt to make available again the heart of Annie Lorrain Smith's classic and scarce two volume "Monograph" of 1918 and 1926—that great life work which, along with Leighton's, seems almost to have crystallized British lichenology into the most distinctly nationalistic of all. But the value of this (as of any) beginner's manual will be determined by how well it helps people name plants, and I am afraid that some beginning lichenologists are about to be in for tough sledding. After a quick eight-page disposal of the generalities of lichen study, we are given a series of often non-dichotomous keys to orders, families and genera. And more trouble when we turn to the treatment of species and find no keys at all. Instead one (representative?) species of each genus is described in detail, and the rest are indecorously incarcerated in tiny type with abbreviated diagnoses. But in determining his plants, the beginner (like the professional) ends up with all his books that may possibly help him spread out on his work table. If this new manual is of service, I imagine that it will be in telling him in which groups the taxonomy of the "Monograph" has been appreciably modified, to where he may turn for more information and what the equivalents are in William Watson's 1953 "Census" nomenclature which the author, like most British lichenologists, accepts. Perhaps this is really all that is intended anyway, and if it is, this well made and modestly priced book should find a place on many shelves.—W. L. CULBERSON.

JERZY SZWEYKOWSKI: "Prodromus Florae Hepaticarum Poloniae." Poznań Soc. Friends Sci., Dept. Math. & Nat. Sci., Publ. Sect. Biol. 20 (Plant. Crypt.): 1-596 + 4 unnumbered pages. 2 maps. 1958. (Price: zł. 100.—, paper).—This extensive summary of all records of Polish hepatics published up to July 1, 1955 totals 222 species. American bryologists may take some comfort in noting that theirs is not the only country in which large areas are bryologically poorly known. According to a map showing relative completeness of collection, about one-third of Poland is "unexplored," and only about one-quarter is designated as "± well explored." This catalogue is an excellent foundation for further floristic work locally and will no doubt stimulate a great deal of collecting activity in the "unexplored" portions of the country. Although written entirely in Polish except for a few pages of explanatory matter in English, the "Prodromus" can be used to advantage by floristic-minded bryologists with no knowledge of that language because of an orderly citation by geographic divisions which can be readily located on a supplementary map.—H. CRUM.

C. C. CUNNINGHAM. *Forest Flora of Canada. Flore Forestière du Canada.* Dept. of Northern Affairs (Canada), Forestry Branch, Bull. 121. x + 144 pp. 349 photographs. 1959. (Price: $1.50, cardboard).—This booklet is intended as a picture guide for the use of foresters in identification. It would make an acceptable gift to children, because of its simplified approach to taxonomy, and would be useful to amateur naturalists who have the patience to leaf through the book until they find an illustration suggestive of the plant at hand. Professional botanists visiting Canadian forests would no doubt find it much easier to use standard manuals with keys and descriptions and with the added grace of greater completeness. The black-and-white photographs depict three lichens, three liverworts, 23 mosses, 30 pteridophytes, and 290 seed plants, all taken from dried specimens, but most of them are attractive and surprisingly effective. Lists of poisonous and edible plants and a bibliography for further reference are also presented—H. CRUM.

RECENT LITERATURE ON MOSSES

MARGARET FULFORD[1]

ABRAMOVA, A. L. [*Indusiella thianschanica* Broth. et C. Müll. (Notula anatomico-morphologica).] Acta Inst. Bot. nom. V. L. Komarov Acad. Sci. URSS. Pl. Crypt. 11: 186-191. 3 fig. 1956. [Russian]

——— & I. I. ABRAMOV. *Hydrogonium chrenbergii* (Lor.) Jaeg. ex Asiae Mediae. *Ibid.* 11: 191-200. 4 fig. 1956. [Russian]

ALLORGE, VALIA. Deux espèces de mousses nouvelles pour la France. Rev. Bryol. et Lichén. 27 (3/4): 188-190. 13 fig. 1958.

ANDERSON, L. E. The mosses of North Carolina. VIII. Grimmiaceae to Orthotrichaceae. The Bryologist 61(4): 285-313. 1958 [1959].

ANDO, H. The *Hypnum* species restricted to Japan and adjacent areas (2). Jour. Sci. Hiroshima Univ., Ser. B., Div. 2 (Bot.) 8: 1-18. 15 fig. 1957. [New: *H. percrassum* n. sp., *H. densirameum* n. sp.]

———. *Tutigaca*, a new genus of Hypnaceae from Japan. Jour. Jap. Bot. 33(6): 175-181. 1 fig. 1958. [New: *T. brachytheciella* (Br. & Par.) n. comb.]

——— & Y. SASAKI. The vegetation and flora of bryophytes on Mt. Ontake, Japan. Sci. Res. Mt. Ontake, Ser. 6. Pp. 645-715. 1 fig. 1958. [Japanese with English summary; 166 sp., 7 var. mosses; 72 spp., 1 ssp., 3 var. hepatics]

ANDREWS, A. L. Bryophytes of the Mount Greylock region V. Rhodora 59(698): 25-26. 1957. [16 mosses, 3 Sphagna, 10 hepatics]

———. Notes on North American *Sphagnum*. X. Review. The Bryologist 61(4): 269-276. 1958 [1959].

ARNELL, S. & O. MÅRTENSSON. A contribution to the knowledge of the bryophyte flora of W. Spitsbergen, and Kongsfjorden (King's Bay, 79° N.) Arkiv Bot. II, 4(6): 105-164. 4 fig. 1959. [129 mosses; 66 hepatics]

BARKMAN, J. J. De Voorjaarsexcursie naar Winterswijk. Buxbaumia 12(3/4): 33-45. 1958. [Report of the spring field meeting with list of bryophytes; English summary]

[1] Dept. of Biological Sciences, University of Cincinnati, Cincinnati 21, Ohio.

BARNES, CLARA. The genus *Paraleucobryum*. The Bryologist 61(4): 335-339. 22 fig. 1958 [1959]

BECKEL, DOROTHY K. BROWN & B. E. IRVINE. Botanical studies at Duke of York Bay, Southampton Island, Northwest Territories, Canada. Defense Res. Northern Lab. Technical Paper 25. 37 pp. 5 pl. 1954. [Many bryophytes and lichens]

BOROS, Á. Moss geography of the Soviet portion of the Carpathians. Acta. Biol. Acad. Sci. Hungaricae. Suppl. 2: 14. 1958. [Abstract]

BUCH, H. Theoretische Betrachtungen über die Ursachen der Sporogonverzweigung und der Entstehung überzähliger Peristome bei Laubmoosen.—Spiegelbildzwillinge. Mem. Soc. Fauna et Flora Fenn. 33: 65-68. (1956-1957) 1958.

BURKHOLDER, P. R. Organic nutrition of some mosses growing in pure culture. The Bryologist 62: 6-15. 1 tab. 2 fig. 1959.

CHEN, P-C. Preliminary report of the cenological and geographical study of Chinese mossflora. Acta Phytotax. Sinica 7(4): 271-293. 1958. [Chinese]

CHOPRA, R. S. & P. O. SHARMA. Cyto-morphology of the genus *Pogonatum* Palis. Phytomorphology 8(1/2): 41-60. 74 fig. 1958.

CORTÉS, L. C. Aportaciones a la briologia española. Una rápida vista al "Monasterio de Piedra." Anal. Inst. Bot. Cavanilles 15: 491-498. 1 fig. 1957. [2 hepatics, 29 mosses]

COURTEJAIRE, J. Note sphagnologique sur le Donézan. Monde Pl. 320: 21-22. 1956. [7 spp.]

———. Aperçu sur la flore sphagnologique et sa distribution dans les massif du Sidobre. Rev. Bryol. et Lichén. 27(3/4): 172-178. charts. 1958.

CRUM, H. & L. E. ANDERSON. Taxonomic studies on North American Mosses. VI-XIII. Jour. Elisha Mitchell Soc. 74: 33-40. 1958.

——— & H. A. Miller. Bryophytes from Guadalupe Island, Baja California. Southw. Nat. 1(3): 116-120. 1956. [15 mosses, 3 hepatics]

DELVOSALLE, L., F. DEMARET & A. LAWALREE. La distribution en Belgique de *Neckera crispa* Hedw. Bull. Soc. Bot. Belg. 88: 147-148. 1 map. 1956.

DEMARET, F. Une variété nouvelle de mousse du Mont Kenya. Bull. Soc. Bot. Belg. 88: 92. 1956. [New: *Grimmia perichetialis* var. *pilifera* n. v.]

——— & FR. L. DE RUYVER. L'expansion de l'aire d'*Orthodontium lineare* Schwaegr. en Belgique. Bull. Jard. Bot. Bruxelles 26(4): 309-312. 1 fig. 1956.

——— & R. POTIER DE LA VARDE. Trois *Fissidens* et un *Philonotis* nouveaux du Ruwenzori. Bull. Jard. Bot. Bruxelles 27(4): 755-762. Fig. 77-80. 1957. [New: *Fissidens cataractarum* n. sp., *F. Robynsianus* n. sp., *F. pachylomadelphus* n. sp., *Philonotis amblystegioides* n. sp.]

ESTEVE CHUECA, F. & L. C. CORTÉS. El estrato liquénico-muscinal en la durilignosa de la Sierra de Cartagena. Anal. Inst. Bot. Cavanilles 13: 121-128. 1 fig. 1955. [3 mosses; new: *Trichostomum viridulum unguiculatum* (Philib.) n. c., *Funaria dentata mediterranea* (Lindb.) n. c.]

GIACOMINI, V. Sulle distribuzione ed ampiezza ecologica di *Leptodon smithii* Mohr nelle Alpi Italiane. Atti Ist. Bot. Pavia V. 12(1): 73-97. 5 fig. 1 pl. 1954.

GROENHUIJZEN, S. & W. D. MARGADANT. Bryophyten bij de Plasmolen (Mook). Buxbaumia 12(1/2): 17-21. 1958. [English summary]

GYÖRFFY, I. Regionale Depression dokumentieren die Bryophyta der "Telkibányaer Eishohle." Ann. Hist.-Nat. Mus. Nat. Hungarici N.S. 8: 93-100. Fig. 1-4. 1957. [New: *Isoptergyium muellerianum* f. *longinervis* [sic]n. f.]

———. In Herbarproben aufgefundene, missgebildete Splachnazeensporogone. Mem. Soc. pro Fauna et Flora Fenn. 33: 62-64. 10 fig. (1956-1957) 1958.

———. Gemellologica bryologica. I-II. Rev. Bryol. et Lichén. 27(3/4): 211-215. 1958.

Hartog, C. den. *Grimmia maritima* te West-Terschelling. Buxbaumia 12(1/2): 15-16. 1958. [*G. maritima* found for the first time for The Netherlands on the dike of the island of Terschelling]

Higinbotham, Betty W. & N. Higinbotham. *Brachythecium hylotapetum* n. sp. The Bryologist 61(4): 339-350. 1 map. 20 fig. 1958 [1959].

———. Notes on some specimens of *Brachythecium* and *Cirriphyllum* from the Pacific Northwest. *Ibid.* 61(4): 350-355. 1958 [1959].

Holmen, K. Three west arctic moss species in Greenland. Meddel. om Grønland 156(3): 1-15. 3 tab. 2 fig. 1957.

———. Cytotaxonomical studies in some Danish mosses. Bot. Tidsskr. 54: 23-43. 38 fig. 1958. [Chromosome numbers of 36 Danish mosses]

——— & Bodil Lange. *Sphagnum wulfianum* and *Sphagnum centrale*. Bot. Tidsskr. 54: 379-386. 5 fig. 2 tab. 1958.

Hosakawa, T. Epiphytic-quotient. Bot. Mag. Tokyo 63(739-740): 18-20. 1950.

———. On the nomenclature of aerosynusia. *Ibid.* 64(755-756): 107-111. 4 fig. 1951.

Inoue, T. *Thuidium viride* and its allies. Misc. Bryol. et Lichen. 13: 1. 1957. [New: *T. subviride* (Sak.) stat. nov.; Japanese]

———. Variations in *Mnium cuspidatum*. *Ibid.* 13: 2. 14 fig. 1957. [Japanese]

———. Two Mniums newly added to the flora of Japan. *Ibid.*, 13:3. 1957. [Japanese]

Iwatsuki, Z. & A. J. Sharp. *Molendoa sendtneriana* in the United States. The Bryologist 61(4): 356-359. 7 fig. 1958 [1959]

Jelenc, F. Contribution à l'étude de la flore bryologique di Tibesti. *In* P. Quézel, Mission Botanique au Tibesti. Univ. d'Algér. Inst. Recherches Sahariennes. Mém. 4: 83-88. 1958. [27 mosses]

Johnsen, T. N., Jr. Terrestrial cryptogams in a pine woodland with and without litter. The Bryologist 62(1): 35-41. 6 fig. 2 tab. 1959.

Kelová-Klečková, V. [Beiträge zur Physiologie der Bryophyten. Einige Aminosäuren als Stickstoff- und Kohlenstoffquellen und ihr Einfluss.] Preslia 31(2): 166-178. 2 fig. 5 tab. 1959. [Studies on some hepatics and pleurocarpous mosses.]

Kildjuschevsky, I. D. Ad floram muscorum e montibus Uralensibus subpolaribus. Plantae Cryptogamae, Acta Inst. Bot. nom. V. L. Komarovii Acad. Sci. URSS. II, 11: 313-332. 1 map. 1956. [181 species; Russian]

King, Kathleen A. L. New records of bryophytes found during a botanical tour in June, 1952. Irish Nat. Jour. 11: 230-231. 1954.

———. *Meesia tristicha* Bruch & Schimp. in Ireland. *Ibid.* 12(12): 332. 1958.

Koch, L. Mosses of California VI. Hall Natural Area and Mono County. Madroño 14: 206-211. 1958.

Kucyniak, J. On *Drepanocladus badius* in continental North America. The Bryologist 61(2): 124-132. 1 map. 1958.

Lachmann, A. Coup d'oeil sur les "bryo-associations" observées au long de la session du Jura. Bull. Soc. Bot. France 105 (84e Session extraordinaire): 37-44. 1958.

LAWTON, ELVA. Mosses of Nevada. The Bryologist 61(4): 314-334. 1 map. 1958 [1959]. [A key and 143 taxa with localities]

MCCLEARY, J. A. The bryophytes of a desert region in Arizona. The Bryologist 62(1): 58-62. 1959. [2 hepatics, 11 mosses]

MALCUIT, G. René de Litardière (1888-1957). Rev. Bryol. et Lichén. 27(3/4): 227-230. 1958.

MARGADANT, W. D. Mossenstudie in Hortus de Wolf III. Buxbaumia 12(1/2): 26-27. 1958. [Rare bryophytes found in the unique botanical garden "de Wolf"; English summary]

——— & R. VAN DER WIJK. Verslag van de excursie naar Wanneperveen 14-15. September 1957. Buxbaumia 12(1/2): 2-7. 1958. [Report of the field meeting; list of plants collected; English summary]

——— & ———. The citation of the "Bryologia Europaea." Taxon 7(4): 97-103. 1958.

MEIJER, W. Over de Mosflora van de Nederlandse Vennen. Buxbaumia 12(3/4): 46-52. map. 1958. [Moss flora of the moorland bogs and fens; English summary]

MOUL, E. T. The bryophytes and lichens of Onotoa, Gilbert Islands. The Bryologist 61(4): 370-373. 1958 [1959]. [3 mosses, 2 hepatics, 8 lichens]

MILLER, H. A. & J. W. THOMSON. The 1958 foray of the American Bryological Society. The Bryologist 62(1): 67-73. 1 fig. 1959. [With lists of mosses and hepatics found on the excursion]

NAGANO, I. Vegetation of *Rhacomitrium anomodontoides* Card. on tree trunks. Misc. Bryol. et Lichen. 16: 4. 1958.

NOGUCHI, A. On *Erythrodontium leptothallum*. *Ibid.* 15: 4. 1957. [Japanese, new: *Homomallium leptothallum* (C. Müll.) n. c.]

———. A review of Japanese *Rhacomitrium*. *Ibid.* 15: 1-3. fig. 1958. [Japanese, new: *R. heterostichum* v. *diminutum* (Card.) stat. n., and v. *nitidulum* (Card.) stat. n.]

———. Key to the Japanese *Philonotis*. *Ibid.* 17: 2-3. 1958. [Japanese]

———. A list of mosses from Mt. Ontake, Central Japan. Jour. Hattori Bot. Lab. 20: 272-288. 2 fig. 1958. [248 sp. and varieties; new: *Philonotis hattorii* n. sp., *Macomitrium nipponicum* n. sp.]

———. Musci Japonici Exsiccati 13. Nos. 601-649. 1958. A. Noguchi, Editor. *Ibid.* 20: 355. 1958. [List]

——— & H. FURUTA. Regeneration in *Brothera leana*. The Bryologist 61(4): 361-366. Fig. a-g. 1958 [1959]

———. [The bryophyte communities in the Towada Lake district, Northern Japan.] Ecological Review [Sendai] 15(1): 53-64. 1 tab. 1959. [Approx. 100 spp.; Japanese with English summary]

OCHI, H. Autecological study of mosses in respect to water economy. I. On the minimum hydrability within which mosses are able to survive. Bot. Mag. Tokyo 65(767-768): 112-118. 3 tab. 1952. [English]

OSADA, T. On the habitats of *Eucladium verticillatum*. Misc. Bryol. et Lichen. 15: 3. 1958. [Japanese]

OTI, K. Bryophyta collected in the Nii District, Prov. Iyo. III. Bot. Mag. Tokyo 63: 77-82. 1950. [Japanese with English summary; new: *Heterophyllium sikokeanum* Sak. n. sp., *Isopterygium capitulatum* Sak. n. sp., *Mnium giganteum* Sak. n. sp., *Thuidium* (Euthuidium) *iyoense* Sak. n. sp., *Brotherella otii* Sak., n. sp., *B. herbacea* Sak. n. sp. *B. hypnoides* Sak. n. sp.]

PANDÉ, S. K. & N. CHOPRA. Cytological studies in Indian Mosses. I. *Pogonatum microstomum* (R. Br.) Brid., *P. stevensii* Ren. & Card., *Bryum*

nitens Hook., and *Physcomitrium pyriforme* (L.) Brid. Jour. Indian Bot. *37*: 539-547. 8 fig. 1 pl. 1958.

Pavletic, Z. & S. Grom. Quelques bryophytes nouveaux en Yougoslavie et en Slovénie. Rev. Bryol. et Lichén. *27* (3/4): 186-187. 1958. [3 hepatics, 11 mosses]

Peciar, V. O súčasnom stave a perspektivach pol'skej bryológie. [Über den gleichzeitigen Zustand und den Perspektiven der polnischen Bryologie.] Biológia [Bratislava] 13(12): 935-937. 1958. [In Czech]

Persson, H. & O. Gjaerevoll. Bryophytes of the interior of Alaska. Skr. Vid.-Akad. Oslo. 1957(5): 1-74, 4 fig. 1957. [37 hepatics, 8 Sphagna, 139 mosses]

Phillips, E. A. Bark bryophyte unions in southern Ireland. The Bryologist 62(1): 24-31. 1 map. 2 tab. 1959.

Piovano, G. Muschi santacatariensi. Sellowia 10(9): 87-115. 1958. [86 spp. of mosses from Brazil]

Potier de la Varde, R. C. Contribution à la flore bryologique africaine II. *27*. Tanganyika, *28*. Nyasaland. Rev. Bryol. et Lichén. *27*(3/4): 139-144. 3 fig. 1958. [53 spp. & var.; new: *Leucoloma tanganyikae* n. sp., *Solmsiella ceylonica* (Thw. & Mitt.) v. *africana* n. v.]

Prior, P. V. Further bryophytes from the Shenandoah National Park. The Bryologist 62(1): 41-45. 1959. [5 hepatics, 21 mosses]

Proskauer, J. On the peristome of *Funaria hygrometrica*. Amer. Jour. Bot. 45(7): 560-563. 5 fig. 1958.

Pursell, R. A. Discovery of *Solmsiella kurzii* in Louisiana. The Bryologist 61(4): 366-367. 1958 [1959]

[Rabotnov, T. A. & V. S. Govorukhin]. Musci. *In* [I. V. Larin (editor)], [Forage Plants of the USSR, Vol. I]. Pp. 99-104. Fig. 39-42. Tab. 38-41. 1950. [Vsesoiuznyi Nauchno-issiedovatel'skii Inst. Kormov]. [In Russian]

Redfearn, P. L., Jr. Bryophytes of southwest Missouri. I. New distribution records. The Bryologist 62(1): 57-58. 1959.

de Regel, C. Contribution à la connaissance des mousses épiphytes de la Lithuanie. (L.S.S.R.) Rev. Bryol. et Lichén. *27*(3/4): 179-185. 2 fig. 3 charts. 1958.

Reijnders, W. J. De mossen en lichenen van de Amsterdamse bakstenen grachtmuren. Buxbaumia 12(1/2): 21-25. 1958. [Mosses and lichens growing on the walls of the numerous canals of Amsterdam; English summary]

———. De mooseninventarisitie en -kartering van het grote Pinetum van Schovenhorst te Putten (G). Buxbaumia 12(3/4): 53-75. 1958. [English summary]

Robinson, H. *Leskea angustata* in Mexico. The Bryologist 62(1): 31-35. 13 fig. 1959.

Rungby, S. *Leptodontium flexifolium* (Smith) Hampe, var. *gemmiferum* (Schpr.) n. comb. found in Denmark. Bot. Notis. *3*(2): 177. 1958.

Sakurai, K. Studies of the genus *Hypophyla* in Japan. Bot. Mag. Tokyo 67(787-788): 38-42. 6 fig. 1954. [Japanese; new: *H. asanoi*, n. sp., *H. bilo-insulare* var. *elata* n. v., *H. nakayaniae* n. sp., *H. naganoi* n. sp., *H. subspathulata* n. sp.]

Savicz-Ljubitzkaja, Lydia I. *Trichostomum cuspidatissimum* Card. et Thér.—Species nov. ad bryofloram URSS. Acta Inst. Bot. nom. V. L. Komarov Acad. Sci. URSS. Pl. Crypt. 11: 200-210. 3 fig. 1956 [Russian]

SAWARAGI, S. The epiphytic bryophyte community on *Shiia cuspidata* Makino Jap. Jour. Ecol. 6(4): 159-162. 1 fig. 3 tab. 1957. [English summary]

———. The epiphytic bryophytic community on *Pinus densiflora* Sieb. et Zucc. *Ibid.* 7(3): 115-117. 1 tab. 1957.

———. The epiphytic bryophyte community on *Cornus controversa* Hemsl. *Ibid.* 8(1): 34-37. 1 fig. 4 tab. 1958.

SHIN, T. Some Philippine mosses distributed by A. D. E. Elmer. Misc. Bryol. et Lichen. 14: 2-3. 1957. [22 spp., Japanese]

SHIN-CHIANG, L. The genus *Bryoxiphium* in China. Acta Phytotax. Sinica 7(3): 253-262. 4 fig. 1958. [Chinese with English summary]

STEERE, W. C. Bryophytes of arctic America. VII. A collection from the delta region of the Mackenzie River. The Bryologist 61(3): 182-190. 1958.

STEFUREAC, T. I. Un caz de poliploide la *Polytrichum norvegicum* Hedwig. Bul. Stiintific Acad. Rep. Pop. Romaine. Biol. Ser. Bot. 9(4): 327-338. 1957. [Russian and French summaries]

SUZUKI, H. Taxonomical studies in the Subsecunda group of the genus *Sphagnum* in Japan, with special reference to variation and geographical distribution. Jap. Jour. Bot. 16(2): 227-268. 10 fig. 1958. [Keys, discussions, illustrations, distribution; new: *S. kushiroense* n. sp.]

SZWEYKOWSKI, J. [On the distribution of moss communities in the streams of the Gory Stolowe Mountains (Suedeten). Poznán Soc. Friends of Sci., Dept. Math. & Nat. Sci., Biol. Sect. 13(3): 1-46. 1 fig. 1 pl. 1951. [Polish with English summary]

TAKAKI, N. On the Japanese name of *Nanomitrium tenerum*. Misc. Bryol. et Lichen. 15: 4. 1958. [Japanese]

———. Occurrence of *Encalypta streptocarpa* Hedw. in Japan. *Ibid.* 16: 2-3. 1958. [Japanese]

———. The bryophyte vegetation of Ontake Mountain, Central Japan. Jour. Hattori Bot. Lab. 20: 245-271. 1 map. 3 tab. 8 photo. 1958. [Japanese with English summary; ecological]

TAKAMIZU, N. Musci of South Okutama, Tokyo. Misc. Bryol. et Lichen. 16: 2-3. 1958.

THWAITES, F. T. & K. BERTRAND. Pleistocene geology of the Door Peninsula, Wisconsin. Bull. Geol. Soc. Amer. 68: 831-880. 18 fig. 18 pl. 2 tab. 1957. [Discussion of the fossil mosses known from the Two Creeks Interval of the Wisconsin Glaciation, p. 856]

WATANABE, R. On some mosses growing in hotspring water. Misc. Bryol. et Lichen. 13: 2. 1957. [Japanese]

WILLIAMS, H. *Phascum floerkeanum* in Ontario. The Bryologist 62(1): 55-57. 1959.

WILLIS, J. H. New records of mosses for Australian States (Victoria, Tasmania, and the Northern Territory). Victorian Nat. 74: 101-105. 1957.

———. Death of a veteran bryologist (George Osborne King Sainsbury, 1880-1957.) *Ibid.* 74: 118-120. 1 photo. 1957.

VAN DER WIJK, R. Distichous and pseudodistichous mosses. Acta Bot. Neerl. 6: 386-391. 5 fig. 1957.

YANO, K. On the chromosomes in some mosses. I. Bot. Mag. Tokyo 64(761-762): 234-237. 39 fig. 1 tab. 1951. [22 spp., 2 var.; Japanese with English summary]

———. On the chromosomes in some mosses. II. *Ibid.* 65(769-770): 195-

198. 34 fig. 1952. [Japanese; 15 spp. for chromosomes no. and heterochromosomes]

———. On the chromosomes in some mosses. III. *Ibid.* 66: 43-48. 1953.

———. On the chromosomes in some mosses. IV. Sex chromosomes and polyploidy of *Polytrichum*. *Ibid.* 66: 197-202. 1953.

———. On the chromosomes in some mosses. V. The karyotypes of sex-chromosomes in some species of Polytrichaceae. *Ibid.* 67: 43-48. 41 fig. 1954. [Japanese with English summary]

RECENT LITERATURE ON HEPATICS

MARGARET FULFORD[1]

ALBRECHT, H. Interessante Formen von *Calypogeia fissa* (L.) Raddi und *Calypogeia Neesiana* (Mass. et Car.) K. Müll. Rev. Bryol. et Lichén. 27(3/4): 166-171. 2 fig. 1958.

AMAKAWA, T. [What is *Jungermannia sieboldi?*] Misc. Bryol. et Lichen. 14: 2. 1957. [Japanese]

———. Notes on the Japanese Hepaticae (2). Jour. Jap. Bot. 31(2): 15-18, 47-50. Fig. 2-3. 1956. [New: *Solenostoma rishiriense* n. sp., *S. rotundatum* n. sp.]

———. Notes on Japanese Hepaticae (7). *Ibid.* 33(5): 142-145. 1958. [New: *Cololejeunea uchimae* n. sp., *Plectocolea tetragona* (Ldbg.) n. c.]

ANONYMOUS. Operation *Marchantia*. Carolina Tips (Carolina Biol. Supply Co.) 21: 1-2. 4 fig. 1958.

ARNELL, S. A new species of *Riccia* from Israel. Bull. Research Council, Israel 6D(1): 56-57. 5 fig. 1957. [New: *R.* (Ricciella) *palaestina* n. sp.]

———. Genus *Jungermannia* in South Africa. Bot. Not. 111(4): 619-622. 2 fig. 1958. [New: *J. austroafricana* n. sp.]

———. Hepatics from Tristran da Cunha. Results, Norwegian Sci. Exp. to Tristran da Cunha 1937-1938. No. 42: pp. 1-73. 30 fig. 1958. [123 hepatics; new: *Anastrophyllum incumbens* (Lehm. et Ldbg.) n. c., *Cephaloziella tristaniana* n. sp., *C. varians* (G.) n. c., *Cololejeunea olivacea viridis* n. sp., *Drepanolejeunea tristaniana* n. sp., *Frullania tristaniana* n. sp., *Jungermannia tristaniana* n. sp., *Lejeunea longicollis* n. sp., *Lepidozia breviseta* (Herz.) n. c., *Leucolejeunea tristaniana* n. sp., *Lophocolea christopherseni* n. sp., *L. gracillima* n. sp. ad interim, *L. minima* n. sp., *L. tristaniana* n. sp., *Lophozia squarrosa* n. sp., *Marsupidium brevifolium* v. *tristanianum* n. v., *Mylia grandistipus* (St.) n. c., *Plagiochila fragilifolia* n. sp., *P. infuscata* f. *gracilis* n. f., *Riccardia christopherseni* n. sp., *R. meylandii* n. sp., *R. tristaniana* n. sp., *Symphyogyna tristaniana* n. sp., *Syzygiella tristaniana* n. sp., *Telaranea sejuncta* (Ångstr.) n. c.]

———. A new species of *Plagiochila* from West Patagonia. Svensk Bot. Tidskr. 52: 549-550. Fig. 1, a-f. 1958. [New: *P. ofquiensis* Arn. & Herz. n. sp.]

——— & O. MÅRTENSSON. A contribution to the knowledge of the bryophyte flora of W. Spitsbergen, and Kongsfjorden (King's Bay, 79° N.) in particular. Ark. Bot. 2, 4(6): 105-164. 4 fig. 1959. [66 hepatics; new

[1] Dept. of Biological Sciences, University of Cincinnati, Cincinnati 21, O.

hepatics: *Scapania obcordata* (Berggr.) S. Arn. n. c., *Cleeva hyalina* f. *rufescens* S. Arn. n. f.]

Berrie, G. K. The cytology of *Haplomitrium hookeri*. The Bryologist 62(1): 1-5. 3 fig. 1959.

Carl, H. Die Stellung der Plagiochilen in System der Lebermoose. Feddes Repert. 59(1): 98-113. 9 fig. 1956.

Casas de Puig, Cruz. Una hepática nueva para la flora catalina. La *Trichocolea* Collect. Bot. Barcelona 3(30): 395-397. Map. 1953.

Chopra, N. & R. Udar. Cyto-taxonomic studies in the genus *Riccia* (Mich.) L. II. *Riccia crystallina* L. and *R. cruciata* Kash. Jour. Indian Bot. Soc. 36(4): 535-538. 6 fig. 1957.

Clark, Lois. *Frullania* species collected in Louisiana by Koch. The Bryologist 62(1): 62-65. 1959. [8 species]

Erdtman, G. Pollen and spore morphology. Plant Taxonomy. Gymnospermae, Pteridophyta, Bryophyta. Pp. 1-151. 5 pl. 265 illus. 1957. Ronald Press, New York. [Bryophyta pp. 99-124. Figs. 192-253]

Fitzgerald, Jean W. Some Irish liverwort records. Irish Nat. Jour. 10(4): 107. 1950. [9 species]

Fulford, Margaret & R. Hatcher. *Triandrophyllum*, a new genus of leafy Hepaticae. The Bryologist 61(4): 276-285. 25 fig. 1958 [1959]. [A member of the Herbertaceae; new: *T. subtrifidum* (Hook. & Tayl.) n. c., *T. durum* (St.) n. c., *T. antarcticum* (St.) n. c.]

Hässel de Menendez, G. G. *Monoclea forsteri* en Argentina. Bol. Soc. Argentina Bot. 6(3/4): 248-250. 1 fig. 1957.

———. Nota preliminar sobre especies de *Riccia halladas* en Argentina. *Ibid.* 7(2): 99-115. 4 fig. 1958.

Hattori, S. A short review of some genera of Japanese Lejeuneaceae. Misc. Bryol. et Lichen. 14: 1-2. 1957. [Japanese; new combinations: *Lejeunea auriculata* (St.) n. c., *L. claviflora* (St.) n. c., *Cheilolejeunea nipponica* (Hatt.) n. c., *C. ontakensis* (St.) n. c., *C. obtusifolia* (St.) n. c., *C. imbricata* (Nees) n. c., *C. obtusilobula* (Hatt.) n. c.]

———. *Takakia lepidozioides*. *Ibid.* 17: 1-2. 1958. [Japanese]

———. The Hepaticae of Ontake Mountain, middle Japan. Jour. Hattori Bot. Lab. 20: 33-53. 1958. [144 spp. and var.; new: *Gymnocolea inflata* ssp. *montana* (Horik.) n. c., *Marsupella disticha* v. *pseudofunckii* (Hatt.) n. c.]

——— & M. Mizutani. *Pachyglossa tristicha* Herz. and its relationships. Jour. Jap. Bot. 33(12): 359-363. 2 fig. 1958.

——— & ———. What is *Takakia lepidozioides?* Jour. Hattori Bot. Lab. 20: 294-303. 3 fig. 1958.

———, ———, & H. Inoue. On the archegonia of *Takakia lepidozioides*. Jour. Jap. Bot. 33(11): 321-322. 4 fig. 1958.

Herzog, T. Lebermoose aus Neukaledonien gesammelt von Dr. O. H. Selling. Ark. Bot. 2, 3(3): 43-61. 9 fig. 1955. [New: *Acromastigum integrifolium* v. *homodictyon* n. v., *Lepidozia wallichiana* v. *Theriotii* (St.) n. c., *Chiloscyphus giganteus* f. *minor* n. f., *C. grandiflorus* v. *latifolius* n. v., *C. subacuminatus* n. sp., *Hygrolejeunea ? falcata* n. sp., *Euosmolejeunea papillata* n. sp., *Mastigolejeunea Sellingii* n. sp.]

———. *Jamesoniella grolleana* Herz., spec. nov. Ein Nachzügler zu der Schwabe'schen Bryophytensammlung aus Westpatagonien. Rev. Bryol. et Lichén. 27(3/4): 145-146. Fig. a-m. 1958.

——— & R. Grolle. Was ist *Pachyglossa*? *Ibid.* 27(3/4): 147-165. 5 pl. 1958. [New: *Pachyglossa tenacifolia* (H. f. & T.) n. c., *P. dissitifolia*

n. sp., *P. spegazziniana* (Mass.) n. c. with v. *spegazziniana* (Mass) n. v. and v. *exilis* n. v., *Lophocolea sikkimensis* (St.) n. c.]

HJELMQUIST, H. Note on the chromosomes of a *Riccia* species. Bot. Not. 111(2): 477-479. 1 fig. 1958.

HODGSON, E. AMY. New Zealand Hepaticae (liverworts). X—Marsupial genera of N. Z. with amendments and additions to paper V. (1946). Trans. Roy. Soc. N. Z. 85(4): 565-584. 19 fig. 1958. [New: *Jackiella curvata* Allison & Hodg. n. sp., *Tylimanthus rotundifolius* (Berggr.) Hodg. n. c., *T. diversifolius* Hodg. n. sp., *Marsupidium perpusillum* (Col.) Hodg. n. c., *M. urvilleanum* (Mont.) Hodg. n. c., *Lethocolea squamata* (Tayl.) Hodg. n. c., *Jungermannia grandifolia* (Berggr.) Hodg. n. c., *Jamesoniella pseudocclusa* Hodg. n. sp.]

INOUE, H. A new and additional descriptions of Hepaticae from Titibu District. Jour. Jap. Bot. 31(11): 340-344. 1 fig. 1956. [New: *Lophocolea itoana* n. sp.]

———. Notes on the taxonomical status of *Lophozia diversiloba*. Bot. Mag. Tokyo 70(833-834): 357-362. 25 fig. 1957. [New: *Lophozia* subg. Hattoriella n. subg.]

———. Studies on spore germination of Hepaticae. 4. *Makinoa crispata* (Steph.) Miyake. *Ibid.* 71(840): 214-217. 15 fig. 1958.

———. An arctic *Scapania* found in the Chichibu Mountains, Japan. The Bryologist 61(3): 259-261. 1958. [*S. cuspiduligera* K. Mull.]

———. Studies on spore germination of Hepaticae. 3. *Brachiolejeunea sandvicensis* (Gott.) Evans and *Frullania hamatiloba* Steph. Jour. Jap. Bot. 33(1): 6-10. 10 fig. 1958.

———. Regeneration of the leaf of *Acrobolbus ciliatus*. *Ibid.* 33(10): 302-306. 1 fig. 1958.

———. The family Plagiochilaceae of Japan and Formosa. I. Jour. Hattori Bot. Lab. 19: 25-59. Fig. 1-11. 1958. [New: *Pedinophyllum interruptum* ssp. *truncatum* (St.) n. c., with v. *jungermannioides* (St.) n. c., *Plagiochila* subg. Chiastocaulon (Carl) n. stat., *P. asplenioides* ssp. *ovalifolia* (Mitt) n. state., with f. *thylimanthoides* (St.) n. c., f. *magna* n. f., v. *miyoshiana* (St.) n. c., *P. satoi* f. *japonomontana* (Hatt.) n. stat.]

———. The family Plagiochilaceae of Japan and Formosa. II. *Ibid.* 20: 54-106. 19 fig. 1958. [New: *Plagiochila rigidula* Hatt. & Inoue n. sp., subsect. Rhizophorae subsect. n., *P. pseudopunctata* Inoue n. sp., subsect Belangerianae (Carl) n. stat., *P. belangeriana* var. *yacandakensis* (Horik.) Inoue n. stat., *P. trabeculata* f. *stipulata* Inoue n. f., *P. semidecurrens* f. *undulata* (Carl) Inoue n. stat., and v. *shimizuana* (Hatt.) Inoue n. stat., *P. horikawana* Inoue n. nom., sect. Yokogurenses Inoue n. sect., *P. yokogurensis* f. *kiushiana* (Hatt.) Inoue n. stat., and f. *curiosissima* (Horik.) Inoue n. stat., sect. Infirmae (Carl) Inoue emend et n. c., *Noguchia opposita* (R. Bl. & N.) Inoue n. c., *N. hattorii* Inoue n. sp.]

IWATSUKI, Z. Correlation between the moss floras of Japan and the Southern Appalachians. Jour. Hattori Bot. Lab. 20: 304-352. 5 fig. 5 tab. appendix. 1958.

——— & S. HATTORI. Studies on the epiphytic moss flora of Japan. 9. The epiphytic bryophyte communities in the subalpine zone of central Japan. *Ibid.* 20: 17-32. 1 fig. 9 tab. 1958.

JOVET-AST, SUZANNE. Valeur spécifique des caractères des cils chez les *Riccia*: un exemple. Rev. Bryol. et Lichén. 27(3/4): 225-226. 4 fig. 1958.

———. Un *Microlejeunea* nouveau de l'Ile de la Réunion. *Ibid.* 27(3/4): 191-194. 26 fig. 1958. [New: *M. dispar* n. sp.]

———. Bryophytes du Haut-Donnai et du Darlac (Viet-Nam). *Ibid.* 27(3/4): 195-200. 1958. [11 hepatics, 29 mosses, 1 *Sphagnum*]

——— & P. Tixier. Hépatiques du Viet-Nam. I. Rev. Bryol. et Lichén. 27(3/4): 201-210. 3 fig. 1958. [85 taxa; new: *Colura* (Heterophyllum) *vietnamensis* n. sp., *Pycnolejeunea* (Doliolejeunea) *molischii* v. *divergens* n. v., *Stylolejeunea asiatica* n. sp.]

Klingmüller, W. Zur Kenntnis der hessischen Ricciaceen. Ber. Oberhessischen Ges. Natur- und Heilkunde zu Giessen. N.F., Naturw. Abt. 28: 12-24. Pl. 1-2. 1957.

Koch, L. Review: Hepaticae et Musci URSS Exsiccati, Decas I-V. Edidit Institutum Botanicorum nomine V. L. Komarovii Akademiae Scientiarum URSS, curavit L. I. Savicz-Ljubitzkaja. Leningrad. 1957. The Bryologist 61(4): 380. 1958 [1959]

Kuwahara, Y. Key to the Japanese species of *Metzgeria*. Misc. Bryol. et Lichen. 16: 5-5. 1958. [Japanese]

———. A revision of the Japanese species of the genus *Metzgeria*. Jour. Hattori Bot. Lab. 20: 124-141. 7 fig. 1958. [New: *M. conjugata* ssp. *japonica* (Hatt.) n. stat., *M. novicrassipilis* n. sp.]

Ladyzhenskaja, K. I. & S. M. Chudaikulov. [De spororum formatione Ricciocarpe natantis (L.) Corda.] Acta Inst. Bot. nom. V. L. Komarova Acad. Sci. URSS. Pl. Crypt. 11: 182-186. 2 fig. 1956. [Russian]

——— & V. M. Obuchova. [The genus *Riella* Mont. observed in fields of *Oryza sativa* in Kazoichstama.] *Ibid.* 11: 176-182. 3 fig. 1956.

LaRue, C. D. & S. Narayanaswami. Auxin inhibition in the liverwort *Lunularia*. New Phytol. 56: 61-70. 35 fig. 1957.

Magdefrau, F. Flechten und Moose im baltischen Berstein. Ber. Deutsch. Bot. Gesell. 70(9): 433-435. Pl. 12. 1957. [New: *Frullania scyphoides* n. sp., *Muscites convolutus* n. sp., both fossil]

Meijer, W. [Outstanding hepatics from the flora of Tjibodas.] Buxbaumia 12(1/2): 8-15. 2 fig. 1958. [English summary]

———. Notes on some Malayan species of *Anthoceros* L. (Hepaticae)—II. Jour. Hattori Bot. Lab. 18: 1-13. 5 pl. 1957. [New: *A. hirticalyx* (Steph.) n. c., *A. meiasporus* n. sp.]

———. Notes on species of *Riccia* from the Malaysian region. *Ibid.* 20: 107-118. 9 fig. 1958. [New: *R. prominens* n. sp., *R. applanata* n. sp., *R. obtusa* n. sp., *R. sumatrana* n. sp.]

Mizutani, M. A key to the Japanese species of *Bazzania*. Misc. Bryol. et Lichen. 14: 3-4. 1957. [Japanese]

———. A twin sporogonium in the calyptra of *Riccardia sinuata*. *Ibid.* 15: 3. 1 fig. 1958. [Japanese]

———. Key to the Japanese species of *Lepidozia*. *Ibid.* 16: 1-2. 7 fig. 1958. [Japanese]

———. On the bryophytic communities of the alpine and subalpine forest floor of the Ontake Mountain. Jour. Hattori Bot. Lab. 20: 289-294. 3 tab. 1958.

Narayanaswami, S. The morphogenetic effects of various synthetic hormones in the liverwort *Lunularia*. Jour. Indian Bot. Soc. 36(2): 180-190. 29 fig. 1957.

Ochi, H. & T. Sasaki. Osmotic values of cell-sap in *Conocephalus conicus* (L.) Necker. Jap. Jour. Ecol. 7(3): 108-111. 4 fig. 1957.

Oxo, M. Study on the sugar in Hepaticae (1-2). Jour. Jap. Bot. 33(2): 60-64, 285-288. 31 fig. 1958. [Paper partition chromatography]

Pandé, S. K. Some aspects of Indian hepaticology. Jour. Indian Bot. Soc. 37(1): 1-26. 9 maps. 1 pl. 1958.

——— & R. Udar. The genus *Riccia* in India. I. A reinvestigation of the taxonomic status of Indian species of *Riccia*. *Ibid.* 36(4): 564-579. 54 fig. 1 pl. 1957.

——— & ———. Genus *Riccia* in India—II. Species of *Riccia* from South India with description of a new species and notes on the synonomy of some recently described ones. Proc. Nat. Inst. Sci. India 24B (2): 79-88. 3 fig. 1958. [New: *R. tuberculata* n. sp.]

——— & ———. A species of *Riccia*, *R. aravalliensis* Pandé et Udar sp. nov., from Mt. Abu, Rajasthan, India. Jour. Indian Bot. Soc. 36(3): 248-253. 9 fig. 1957.

———, K. P. Srivastava, & S. Ahmad. Epiphyllous liverworts of India and Ceylon. II. *Ibid.* 36(3): 335-347. 24 fig. 1957.

Persson, H. The genus *Takakia* found in North America. The Bryologist 61(4): 359-361. 1958 [1959].

Podlech, D. *Grimaldia fragrans* (Balbis) Corda an der Erpeler Ley. Decheniana 109(2): 251. 1957.

Proskauer, J. Anthocerotales. Comments. *In* S. Arnell, Hepaticae from the Juan Fernandez Islands. Ark. Bot. 2, 4: 1-21. 1957. [p. 19, new: *Phaeoceros skottsbergii* (Steph.) S. Arnell n. c.]

———. Studies on Anthocerotales. V. Phytomorphology 7(2): 113-135. 23 fig. 1957 [1958].

———. On Hill, Wiggers, and Necker, and also the genus *Conocephalum*. Taxon 7(5): 123-130. 1958.

———. On law, order and family. *Ibid.* 7: 213-218. 1958.

Rao, A. R. & R. Udar. On a collection of liverworts from Yercaud, South India. Jour. Indian Bot. Soc. 36(3): 328-334. 14 fig. 1957.

Rejment-Grochowska, I. The liverworts of Bieszczady Mts. and some other ranges of Carpathians Mts. from J. Lobarzewaki collections. Acta Soc. Bot. Poloniae 27(2): 273-289. 2 maps. 1958. [63 hepatics; English summary]

Rousseau, Jacqueline. Morphoses du sporogone de deux *Anthoceros* par action de l'acide dichlorophénoxyacetique. Bull. Soc. Bot. France 105(5-6): 234-236. 5 fig. 1958.

Savicz-Ljubitzkaja, Lydia I. & I. I. Abramov. Geological annals of Bryophyta. Bot. Zhurn. 43(10): 1409-1417. 1958. [Russian with English summary]

———, Z. N. Smirnova, A. L. Abramova, I. I. Abramov, & R. N. Schljakov. Hepaticae et Musci URSS Exsiccati, Decas I-V. Edidit Institutum Bot. nomine V. L. Komarovii, Akad. Sci. URSS. Leningrad. 1957.

Sawaragi, S. Ecological and anatomical studies of *Frullania moniliata* in Japan. Jap. Jour. Ecol. 5(1): 14-18. 6 fig. 1955. [Japanese with English summary]

Schiffner, V. Die Lebermoose der Deutschen Limnologischen Sunda-Expedition. Arch. Hydrobiol. Suppl 21: 382-407. 16 fig. 1955. [New: *Aspiromitus squamulosos* n. sp. ad interim, *A. lobatus* n. sp. ad interum, *A. bullosus* n. sp. ad interim, *A. asper* n. sp. ad interim, *Heterolejeunea* n. gen., *H. javanica* n. sp., *Hemilejeunea* n. gen., *H. ruttneri* n. sp., *Rectolejeunea submersa* n. sp., *Lejeunea subaquatica* n. sp., *Scapania rigida* f. *minor* n. f., *S. javanica* v. *scabra* n. v., *Kantia goebelli* f. *thermarum* n. f., *Bazzania praerupta* v. *thermallis* n. v., *Lembidium boschianum* v. *laxa* n. v., with f. *etiolata*, *laxa*, *tenuis*, and *laxa*, n. f., and v. *grandifolia* n. v., *Ruttnerella rhizocaula* n. gen. et n. sp., *Jamesoniella ruttneri* n. sp., *Nardia truncata* v. *elongata* n. v., *B. tetragona* v. *aquatica* n. v., *Pallavicinia indica* v. *aquatica* n. v., *Riccardia platyclada* v. *submersa* n. v., *R. tenuicostata* n.

nom. (*R. crenulata*), *R. jackii* f. *submersa* n. f., *R. diminuta* f. *thermarum* n. f., *Marchantia sumatrana* n. sp., *M. nitida* f. *subaquatica* n. f., *M. emarginata* f. *thermarum* n. f., *Dumortiera velutina* f. *exigua* n. f., and v. *subnuda* n. v., *Riccia canaliculata* var. *javanica* n. v.]

Scott, Edith & H. A. Miller. Notes on Hawaiian Hepaticae. II. Ricciaceae. The Bryologist 61(4): 367-370. Fig. a-l. 1958 [1959].

Schuster, R. M. Notes on Nearctic Hepaticae. XIV. The Chonecoleaceae. Jour. Hattori Bot. Lab. 20: 1-15. 2 fig. 1958. [New: Chonecoleaceae, n. fam., with key]

———. Epiphyllous Hepaticae in the Southern Appalachians. The Bryologist 62(1): 52-55. 1959. [New: *Cololejeunea cardiocarpa* (Mont.) n. c.]

Stefureac, T. I. Le professeur Dr. Simion Stefan Radian (1871-1958). Rev. Bryol. et Lichén 27(3/4): 231-232. portr. 1958.

Svihla, Ruth D. Frullaniaceae of Burma. III. *Frullania kalaweensis* n. sp. The Bryologist 61(4): 373-376. 17 fig. 1958 [1959]

———. Frullaniaceae of Burma. IV. *Frullania maymyoensis* n. sp. *Ibid.* 61(4): 376-379. 1958 [1959]

Srivastava, K. P. Spermatogenesis in *Notothylas levieri* Schiffn. Jour. Indian Bot. Soc. 36(3): 302-305. 15 fig. 1957.

Szweykowski, J. Prodromus florae Hepaticarum Poloniae. Poznan Soc. Friends Sci., Dept. Math. & Nat. Sci. Sect. Biol. 19 (Plantae Cryptogamae): 1-596. 1 map. 1958. [Polish with English summary; list of localities of all liverworts of Poland in alphabetical order, with map to show the areas of exploration.]

———. *Scapania gymnostomophila* Kaalaas, a new liverwort in the Carpathians. Bull. Soc. Amis Sci. & Lett. Pozan. B, 14: 371-377. 3 fig. 1958.

——— & J. Smarda. [*Eremonotus myriocarpus* (Carr.) Pears. in the Tatra Mts. (CSR)]. Biol. Časopis Slovensk. Akad. Vied. 13: 440-444. 2 fig. 1958. [Slovak with English summary]

Tarén, Nilna. Factors regulating the initial development of gemmae in *Marchantia polymorpha*. The Bryologist 61(3): 191-204. 8 fig. 3 graphs. 1958.

Tatuno, S. *Takakia lepidozioides* Hattori & Inoue. Chromosomem bei *Takakia lepidozioides* Hattori et Inoue. Jour. Hattori Bot. Lab. 20: 119-123. 1 tab. 2 fig. 1958. [Japanese with German summary]

Taylor, Jane. The sexual branches of *Aeromastigum bancanum*. The Bryologist 61(3): 252-257. 23 fig. 1958.

Uhar, R. *Riccia crozalsii* Levier and *Riccia Warnstorfii* Limpr. Current Sci. [India] 26: 287-288. 5 fig. 1957.

———. Culture studies in the genus *Riccia* (Mich.) L. I. Sporeling germination in *Riccia billardieri* Mont. et Nees. Jour. Indian Bot. Soc. 36(1): 46-50. 16 fig. 1957.

———. Culture studies in the genus *Riccia* (Mich.) L. II. Sporeling germination and regeneration in *R. crystallina* L. *Ibid.* 36(4): 580-586. 30 fig. 1 pl. 1957.

———. Culture studies in the genus Riccia (Mich.) L. III. Sporeling germination in *R. trichocarpa* Howe—a reinvestigation. *Ibid.* 37(1): 70-77. 17 fig. 1958.

——— & N. Chopra. Cytotaxonomic studies in the genus *Riccia* (Mich.) L. I. *R. billardieri* Mont. et N. and *R. gangetica* Ahmad. *Ibid.* 36(2): 181-195. 5 fig. 1956.

——— & V. B. Singh. Patterns of regeneration in *Notothylas indica* Kashyap. Current Sci. [India] *27*: 23-25. 17 fig. 1958.

Voth, P. Extent of temperature fluctuations on substrates in the greenhouse. Illinois Acad. Sci. 47: 55-61. 6 fig. 1955. [Experiments with *Marchantia*]

Yussa, A. Studies in the cytology of the Pteridophyta. 33. Cytomorphological study of the plant-spermatozoid, with special reference to its phylogenetic meaning. Bot. Mag. Tokyo 67(786-788): 6-14. 6 fig. 1954. [Bryophytes, pp. 9-10. figs. 4-6]

RECENT LITERATURE ON LICHENS—31[1]

William L. Culberson[2]

Ahmadjian, V. Experimental observations on the algal genus *Trebouxia* de Puymaly. Svensk Bot. Tidskr. 53(1): 71-80. 4 pl. 1959. [Study of algae isolated from lichens.]

Ahti, T. Kasvimaantieteellisiä tutkimuksia Newfoundlandissa. [Phytogeographical studies in Newfoundland.] Terra [= Jour. Finn. Geogr. Soc.] 1957(3): 85-87. 1957. [In Finnish. Mention of lichen vegetation and its influence on caribou populations.]

———. Poronjäkälä—kaunista mutta arkaa kasvillisuutta. [Reindeer lichen—a beautiful but easily damaged vegetation.] Suomen Luonto 1957(3): 9-12. 4 fig. 1957. [In Finnish.]

———. Poronjäkäliköistä peurojen asuma-alueina. [Reindeer lichen stands as habitats of wild and domesticated reindeer.] Luonnon Tutkija 61(3): 76-79. 2 fig. 1957. [In Finnish.]

Asahina, Y. Lichenologische Notizen (§ 149). Jour. Jap. Bot. 34(3): 65-66. 1 fig. 1959. [Description of *Acarospora gobiensis* Magn.]

Banfield, A. W. T. & J. S. Tener. A preliminary study of the Ungava caribou. Jour. Mammal. 39(4): 560-573. 3 tab. 1958. [Many excellent lichen pastures have been destroyed by fire.]

Behr, O. Eine neue *Staurothele*-Art von der Lechenge bei Rosshaupten. Nachr. des Naturwiss.-Mus. der Stadt Aschaffenburg 61: 77-84. 1 pl. 1958. [New: *S. fischeri* n. sp.]

Beschel, R. Ricerche lichenomestriche sulle morene del gruppo del Gran Paradiso. Nuova Giorn. Bot. Ital., n. s. 65(3): 538-591. 18 fig. 6 tab. 1958.

Broadhead, E. The psocid fauna of larch trees in northern England—an ecological study of mixed species populations exploiting a common resource. Jour. Animal Ecol. 27(2): 217-263. 5 fig. 17 tab. 1958. [9 spp. make up 95% of the psocid population and eat the corticolous cryptogams *Lecanora conizaeoides* Cromb. and *Pleurococcus* sp. Only 2 spp. actually prefer the lichen. One eats the whole lichen, the other eats only the apothecia.]

Choisy, M. *Archaelichenes*. Les Parméliales *sensu lato*. Bull. Soc. Bot. France, Mém. 1958: 41-52. (1958) 1959. [Phylogenetic observations.]

———. Classification et nomenclature des Parméliales: les Néophysciacés.

[1] The names of new taxa from the Americas are marked with an asterisk (*).

[2] Dept. of Botany, Duke University, Durham, N. C.

Bull. Soc. Mycol. France 75(1): 38-71. 1959. [New: Neophysciales n. order; Borreraceae n. fam.; Tornabeniaceae n. fam.; *Anaptychia* sect. Pseudophyscia (Hue) n. c.; *Tornabenia* sect. Eutheloschystes (Zahlbr.) n. c., sect. Niorma (Mass.) n. c.; Neophysciaceae n. fam. with subfam. Neophyscieae n. subfam. including *Neophyscia* n. gen. with subgen. Pyxine (E. Fr.) n. c., sect. Dirinaria (Tuck.) n. c. sect. Euphyscia (Th. Fr.) n. c., subgen. Dimelaena (Norm.) n. c., subgen. Diploicia (Mass.) n. c., subgen. Phaeocaloplaca n. subgen., sect. Callisporaria n. sect., sect. Conradia (Malme) n. c., sect. Diplotomma (Mass.) n. c., sect. Orcularia (Malme) n. c., sect. Pachysporaria (Malme) n. c., sect. Mischoblastia (Mass.) n. c., sect Beltraminia (Trev.) n. c. and subfam. Blasteniosporaceae n. subfam. with *Blasteniospora* sect. Xanthosolenia (Hillm.) n. c., sect. Xanthoria (Fr.) n. c., sect. Placodium (Ach.) n. c.. subsect. Kuttlingeria (Trev.) n. c., subsect. Aglaeopisma (De Not.) n. c., sect. Blastenia (Mass.) n. c., subsect. Xanthocarpia (Mass.) n. c., subsect. Triophthalmidium (Müll. Arg.) n. c., subsect. Caloplaca (Th. Fr.) n. c., subgen. Gyalolechia (Mass.) n. c., sect. Fulgensia (Mass. & De Not.) n. c., sect. Calolecania n. sect., sect. Calobiatora n. sect., subfam. Solenopsoraceae n. subfam., *Solenopsora* sect. Diphratora (Jatta) n. c., sect. Semilecidea (Räs.) n. c., sect. Praeplacodium n. sect., sect. Chrysospora (Vain.) n. c. (Note: Most, if not all, of these nomenclatorial innovations and modifications are illegitimate for one reason or another.—W.L.C.).]

Cringan, A. T. History, food habits and range requirements of the woodland caribou of continental North America. Trans. North Amer. Wildlife Conf. 22: 485-501. 3 fig. 3 tab. 1957. [Relationship of soil- and tree-inhabiting lichens to forest type and tree crown density.]

Culberson, W. L. "Lichenes Exsiccati" in herbariis Americae septentrionalis asservati. The Bryologist 62(1): 45-52. 1959. [Location of an estimated 70,000 exsiccat specimens.]

Dix, W. L. The lichen collection of the Academy of Natural Sciences of Philadelphia. The Bryologist 62(1): 65-66. 1959. [A list of the more important holdings.]

Dopplebaur, H. W. Studien zur Anatomie und Entwicklungsgeschichte einiger endolithischen pyrenocarpen Flechten. Planta 53(3): 246-292. 19 fig. 1959.

Duncan, Ursula K. A Guide to the Study of Lichens. xxvii + 164 pp. 18 pl. T. Buncle & Co. Ltd. Arbroath, Scotland. 1959. Price: 25 shillings (= $3.50). [Keys to orders, families and genera of lichens of the British Isles. Many spp. Reviewed in this issue of *The Bryologist*.]

Fernald, M. L. & A. C. Kinsey (revised by R. C. Rollins). Edible Wild Plants of Eastern North America. xv + 452 pp. 129 fig. 25 pl. Harper & Brothers, Publishers. New York. 1958. [Lichens, pp. 406-414, pl. 23-25. 4 edible kinds.]

Florovskaja, E. F. De formis *Evernine prunastri* (L.) Ach. [Bot. Materialy] Not. System. e Sect. Cryptogam. Inst. Bot. nomine V. L. Komarovii Acad. Sci. URSS 12(1): 13-18. 1959. [Key in Russian. New: *E. p.* f. *cladonioides* n. f., f. *irregularis* n. f., f. *lata* n. f., f. *paludosa* n. f. f. *vereitinovii* n. f.]

———. *Evernia altaica* Flor. sp. nova. *Ibid.* 12(1): 12-13. 1 fig. 1959.

Frey, E. Die Flechtenflora und -vegetation des Nationalparks im Unterengadin. II. Teil: Die Entwicklung der Flechtenvegetation auf photogrammetrisch kontrollierten Dauerflächen. Ergeb. der wiss. Untersuch. des schweiz. Nationalparks, N. F. 6(41): 237-319. 19 fig. 80 photographs. 24 tab. 1959. [Many lichens, some bryophytes.]

Gilbert, J. L. Huntingdonshire lichens II. Pp. 14-16 *in* "Huntingdonshire Fauna and Flora Society, 11th Annual Report." 1958. [32 taxa.]

———. *Parmelia glomellifera* new to British Isles. The Lichenologist 1(2): 84-85. 1959.

Golubkova, N. S. Species generis *Usnea* [*sic*] in regione mosquaensi. [Bot. Materialy] Not. System. e Sect. Cryptogam. Inst. Bot. nomine V. L. Komarovii Acad. Sci. URSS 12(1): 4-11. 1959. [14 spp.]

Hakulinen, R. Some species of *Candelariella* from North America and central Asia. Arch. Soc. Zool. Bot. Fenn. 'Vanamo' 13(1): 53-55. 1958. [19 taxa. New: *C. medians* v. *americana** n. v., *C. terrigena* v. *placodiomorpha** n. v., *C. kuusamoënsis* v. *areolata* n. v.]

———. Jäkäliä Suomen serpentiinikallioilta. [Flechten auf Serpentinfelsen in Finnland.] *Ibid.* 12(2): 143-145. 1958. [About 100 taxa.]

———. Lichenotheca Fennica a Museo Kuopioensi Edita. Schedae ad Fasciculos XLII-XLIV (NR. 1026-1100). *27* pp. Kuopio. 1958. [Labels for this exsiccat.]

———. Lichenotheca Fennica a Museo Kuopioënsi Edita. Schedae ad Fasciculos XLV-XLVII (NR. 1101-1175). *27* pp. Kuopio. 1959. [Labels for this exsiccat.]

Hale, M. E. Jr. The Mediterranean lichen *Parmelia perreticulata* in central Texas. Southwestern Nat. [Dallas] 3(1-4): 212. (1958) 1959. [New: *P. perreticulata* (Räs.) n. c.]

———. Studies on lichen growth rate and succession. Bull. Torrey Bot. Club 86(2): 126-129. 1 fig. 1 tab. 1959. [6 spp.]

Johnsen, T. N. Jr. Terrestrial cryptogams in a pine woodland with and without litter. The Bryologist 62(1): 35-41. 6 fig. 2 tab. 1959. [8 lichens, 10 bryophytes; study made in North Carolina.]

Kurokawa, S. *Anaptychiae* (lichens) and their allies of Japan (1). Jour. Jap. Bot. 34(4): 117-124. 5 fig. 1959. [New: *A. hypoleuca* v. *microphylla* n. v. with f. *granulosa* n. f.]

———. *Anaptychiae* (lichens) and their allies of Japan (2). *Ibid.* 34(6): 174-184. 6-9 fig. 2 pl. 1959. [5 spp. New: *A. speciosa* v. *microspora* n. v.; *A. pseudospeciosa* n. sp. with f. *tagaeae* n. f. and v. *inactiva* n. v.; *A. esorediata* f. *condensata* n. f.; *A. dissecta* n. sp. and v. *koyana* n. v.]

Lamb, I. M. (63) Proposal for conservation of *Stereocaulon* (Schreb.) Hoffm. against *Stereocaulon* (Schreb. ?) Schrad. and *Coralloides* [Dill.] Hoffm. Taxon 8(6): 207-208. 1959.

Miller, H. A. & J. W. Thomson. The 1958 foray of the American Bryological Society. The Bryologist 62(1): 67-73. 1 fig. 1959. [Many lichens and bryophytes from Greencastle, Indiana.]

Mitchell, M. E. On some interesting lichens from Gorumna (western Ireland). Irish Nat. Jour. 13(1): 13-15. 1959. [Notes on *Cladonia impexa* Harm., *C. leucophaea* des Abbayes, *C. subcervicornis* f. *subregularis* Magn., *C. rangiformis* v. *muricata* (Ach.) Arn., *Cornicularia stuppea* Fw., *C. aculeata* (Schreb.) Ach.]

Morton, F. Liste der von mir im Hochlande von Guatemala 1929 gesammelten Flechten. Arbeiten aus der bot. Sta. in Hallstatt Nr. 166. 1 p. 1956. [Mimeographed; 10 spp.]

Murty, T. K. & S. S. Subramanian. Isolation of ergosterol from *Roccella montagnei*. Jour. Sci. & Indust. Res. 18B(2): 91-92. 1959.

——— & ———. Isolation of carotene from *Roccella montagnei*. *Ibid.* 18B(4): 162-163. 1959.

Räsänen, T. Puuttuuko jäkäläsuku *Usnea* Itä-Lapista? Luonnon Tutkija 62(2): 58. 1958.

Richardson, J. A. The effect of temperature on the growth of plants on pit heaps. Jour. Ecol. 46(3): 537-546. 7 fig. Pl. 14. 2 tab. 1958. [*Holcus mollis* grows more rapidly on pit heaps covered with an insulating moss-lichen mat of *Pohlia nutans* and *Cladonia pyxidata*.]

Roivainen, H. Länsi-Lapin Matkaopas. 191 pp. illus. Kustannusosakeyhtiö Otava. Helsinki. 1957. [Popular mention of lichens in Lappland.]

Rothschild, Lord. The physiology of sea-urchin spermatozoa. Action of pH, dinitrophenol, dinitrophenol + versene, and usnic acid on O_2 uptake. Jour. Exper. Biol. 33(1): 155-173. 9 fig. 2 tab. 1956. [Usnic acid "is more toxic to spermatozoa in dilute than in dense suspension."]

Savicz, V. P. Lichenotheca rossica (regionibus confinibus completa), edidit Institutum Botanicum nomine V. L. Komarovii Akademiae [*sic*] Scientiarum URSS. [Bot. Materialy] Not. System. e Sect. Cryptogam. Inst. Bot. nomine V. L. Komarovii Acad. Sci. URSS 12(1): 1-4. 1959. [Labels for nos. 81-90 in this exsiccat.]

Schade, A. Beiträge zur Kenntnis der Flechtengattung *Cladonia* Hill ex G. H. Web. Mit dem Fundortsverzeichnis der sächsischen Arten Subg. II. Pycnothelia (Ach.) Vain. und Subg. III. Cenomyce (Ach.) Th. Fr. ex Vain. I. Ser. Cocciferae (Del.) Fr. Die Flechten Sachsens VI. Abhandl. und Ber. des Naturkundemus.—Forschungsstelle—Görlitz 36(1): 37-140. 4 fig. 1959. [18 spp. Key. New: *C. polydactyla* f. *montrosa* (Mudd) Grummann n. c., *C. goniocha* (Ach.) Asahina em. Schade.]

Scott, G. D. Stable Pd solution. The Lichenologist 1(2): 88. 1959. [Steiner's formula for a paraphenylenediamine solution.]

Tallis, J. H. The British species of the genus *Usnea*. *Ibid.* 1(2): 49-83. 1959. [Key to 36 spp.]

———. *Usnea pendulina* Mot. new to Britain. *Ibid.* 1(2): 86-87. 1959.

Tavares, C. N. Contributions to the lichen flora of Macaronesia. II—Additions and corrections. Bol. da Soc. Broteriana, 2.ª sér. 32: 225-235. 2 pl. 1958. [11 taxa. New: *Bombyliospora madrensis* (Krempelh.) n. c.]

———. Lichenes Lusitaniae Selecti Exsiccati, Editi ab Instituto Botanico Universitatis Olisiponensis. Fasciculus V. 4 pp. Lisboa. 1958. [Labels for nos. 101-125 in this exsiccat.]

———. Sobre a necessidade de revisão dos taxa liquénicos publicados por Simon de Roxas Clemente y Rubio. Portugalia Acta. Biol. (B) 6(2): 213-218. 1958.

Tomaselli, R. Gli aminoacidi come fonte di azoto nella crescita "in vitro" di micosimbionti lichenici. Atti Ist. Bot. Lab. Crittogam. Univ. Pavia, ser. 5. 16: 180-192. 2 fig. 1959. [*Sarcogyne similis* and *Lecidea steriza*.]

Vězda, A. Lišejníky československých Karpat I. [Flechten der tschechoslowakischen Karpaten (I).] Biologia [Bratislava] 13(12): 890-905. 1 fig. 1958. [30 spp. New: *Parmelia sulcata* f. *isidiata* n. f. German and Russian summaries.]

———. Lišejníky československých Karpat II. (Výsledky lichenologického výzkumu československých Karpat za rok 1957). [Flechten der tschechoslowakischen Karpaten II. (Ergebnisse der lichenologischen Durchforschung im tschechoslowakischen Teile der Karpaten im Jahre 1957).] *Ibid.* 14(2): 86-101. 1959. [9 taxa. Keys in Czech to spp. of *Microglaena*, *Belonia* and *Gyalecta*.]

Wade, A. E. *Lepraria chlorina* Ach. in Britain. The Lichenologist 1(2): 86. 1959.

———. Soil-binder for crustaceous ground lichens. *Ibid.* 1(2): 87-88. 1959.

Wilmanns, O. Zur standörtlichen Parallelisierung von Epiphyten- und

Waldgesellschaften. Beiträge zur Naturkundlichen Forsch. in Südwestdeutschland 17(1) : 11-19. 1 fig. 1958.
———. Epiphytengesellschaften Nordgriechenlands in Vergleich mit denen Mitteleuropas. Phyton 8(1-2) : 175-182. 3 tab. 1959.

NEWS AND NOTES

Dr. Stella M. Hague died on September 5 at Auburn, Indiana. She was 88 years old. She was a member of the society for many years and had taught at the University of Illinois from 1915 to 1940.

Sigma Xi Grants-in-Aid were recently announced for Frederick B. Bevis, University of Michigan ($300 to assist in the study of "The structure, function, and history of bryophyte and lichen micro-communities in relation to forest stands and to site conditions leading to a site identification and classification system"); Daniel H. Norris, University of Tennessee ($200 to assist in the study of "Moss communities of successional and climax forests"); Paul L. Redfearn, Jr., Southwest Missouri State College ($250 to assist in a "Taxonomic and ecological study of the bryophytes of southwest Missouri").

Dr. R. van der Wijk brought with him to the bryology sessions of the Montreal Botanical Congress a bound copy of the first volume of the *Index Muscorum*. At that time it was not yet ready for distribution but could be considered technically published.

Dr. Frank J. Hilferty is spending the academic year at Harvard University working on the mosses of Massachusetts under an NSF grant, with a view to publication of a manual.

At the Montreal Congress it was decided that the publication of Hedwig's *Species Muscorum* should be dated arbitrarily as January 1, 1801, thus permitting the use of names proposed in other publications of 1801.

Dr. and Mrs. Henry S. Conard attended a Nature Camp at Haleyville, Ala., May 30 to June 4, 1959. *Diphyscium cumberlandianum* Harvill was collected at The Dismals, and *Bryoxiphium* was found at Natural Bridge, as previously reported by Harvill. In July and August the Conards were at The Highlands (N. C.) Biological Station, on a NSF grant for the study of mosses of the primeval forest. They were assisted in this by Mr. Melvin L. Conrad of Emory-at-Oxford, Ga., and Mrs. W. Keating Johnson of Philadelphia. Visitors interested in bryophytes were Dr. F. J. Hermann, USDA, Beltsville, Md., Mr. Robert Ireland, Smithsonian Institution, and Dr. F. J. Hilferty of Bridgewater (Mass.) State College, each of whom spent about a week at the Station.

Dr. Henry S. Conard contributed the chapter on bryophytes for the new Ward & Whipple *Fresh Water Biology*.

Raymond Hatcher, who completed his Ph.D. at the University of Cincinnati last spring, has accepted

a teaching position at the University of Tennessee. RONALD A. PURSELL has left the University of Tennessee for a position at the Pennsylvania State College of Forestry, Mont Alto, Penn.

DARVIN W. KECK of Oklahoma State University is the recipient of a National Science Foundation Fellowship to study the lichens of Oklahoma.

Back numbers of *The Journal of the Hattori Botanical Laboratory* are available at the following prices including postage: no. 3, $0.70; no. 4, $0.60; no. 5, $0.70; no. 6, $0.30; no. 7-10, $0.60 each; no. 11-12, $0.80 each; no. 13, $0.50; no. 14-15, $0.80 each; no. 16, $0.90; no. 17, $0.60; no. 18, $1.00; no. 19, $1.10; no. 20, $2.30. The next issue, no. 21, is in press and will be available next spring. Orders should be sent to The Hattori Botanical Laboratory, Obi 3888, Nichinan, Miyazaki, Japan.

JAMES A. MCCLEARY has been awarded a National Institute of Health grant of $2293 for "A Study of mosses as a possible source of antibiotics," and also a National Science Faculty Fellowship to attend Duke University for the 1959-60 academic year.

Volume 62, Number 1 (pp. 1-86) was issued June 3, 1959

Volume 62, Number 2 (pp. 87-163) was issued August 28, 1959

AVAILABLE NOW

ALL BACK NUMBERS

OF

THE BRYOLOGIST

(Some numbers reprinted by photo offset)

COMPLETE SETS

Broken sets Individual Numbers

Price List

Volumes 1-4—$1.25 per volume
(single numbers, 35c)

Volumes 5-36—$2.50 per volume
(single numbers, 60c)

Volume 37—$3.00 per volume
(single numbers, 65c)

Volumes 38-45—$3.50 per volume
(single numbers, 85c)

Volumes 46-49—$4.00 per volume
(single numbers, $1.25)

Volume 50—$8.00 per volume
(single numbers, $2.50)

Later Volumes—$6.00 per volume
(single numbers, $2.00)

All prices net. No discounts. Postage extra.

Order from

Lewis E. Anderson
Department of Botany,
Duke University,
Durham, North Carolina.

MOSSES OF INDIANA

An Illustrated Manual

by WINONA H. WELCH

Attractively printed and strongly bound, this book is designed for beginners and specialists alike. It includes an introduction to bryology and an illustrated glossary, keys, and descriptions. The keys have been specially tailored for the identification of sterile material. 478 pp., 254 fig., 1 map. Cloth, $5.00. The Bookwalter Co., Indianapolis. 1957.

Available from the Division of Forestry, Indiana Dept. of Conservation, Indianapolis 9.

CRYPTOGAMIC BOTANY BOOKS

We buy books on all Natural History subjects, but are especially interested in books, pamphlets, and periodicals on cryptogamic botany. Lists submitted will receive a prompt reply. We pay cash or will arrange a trade. Catalogues issued.

John Johnson
R.F.D. 2
North Bennington, Vt.
U.S.A.

THE HEPATIC EXCHANGE

Beginning January 1, 1939, this Exchange has been operated under the same rules as The Moss Exchange. Privileges are available only to members of the American Bryological Society who have paid annual dues of 25c to DR. LEO F. KOCH, Herbarium, 350 Natural Science Bldg., University of Illinois, Urbana, Ill. Only fully determined specimens in packets with complete data will be accepted. It is suggested that there be at least five packets of each species with an extra which will be forwarded to the Curator of Hepatics for the American Bryological Society Hepatic Herbarium. All material for determination should be sent to the Curator of Hepatics, DR. MARGARET FULFORD, Department of Botany, University of Cincinnati, Cincinnati, Ohio.

THE MOSS EXCHANGE

As announced in THE BRYOLOGIST **38**: 100, Sept.-Oct., 1935, there is now an exchange for mosses. This exchange is available to members of the American Bryological Society upon payment of annual dues of 25c to DR. E. H. KETCHLEDGE, Dept of Forest Botany, State College of Forestry, Syracuse 10, New York. Only fully identified specimens in packets with complete data on them should be sent in. It is suggested that there be five or more packets of each species.

These two exchanges offer an excellent opportunity for A.B.S. members to build up their own herbaria of choice, well-labelled specimens.